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THE EARTH'S BOUNTY

KATE V. ST. MAUR

**DEPT. OF AGRICULTURE
DIV. OF AGR'L EDUCATION**

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1. The first part of the paper is devoted to a general discussion of the problem of the existence of a solution of the system of equations (1) for arbitrary values of the parameters α and β .

THE EARTH'S BOUNTY



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TORONTO



"BETTY"





THE EARTH'S BOUNTY

BY

KATE V. SAINT MAUR

AUTHOR OF "A SELF-SUPPORTING HOME"

WITH MANY ILLUSTRATIONS FROM
PHOTOGRAPHS

New York

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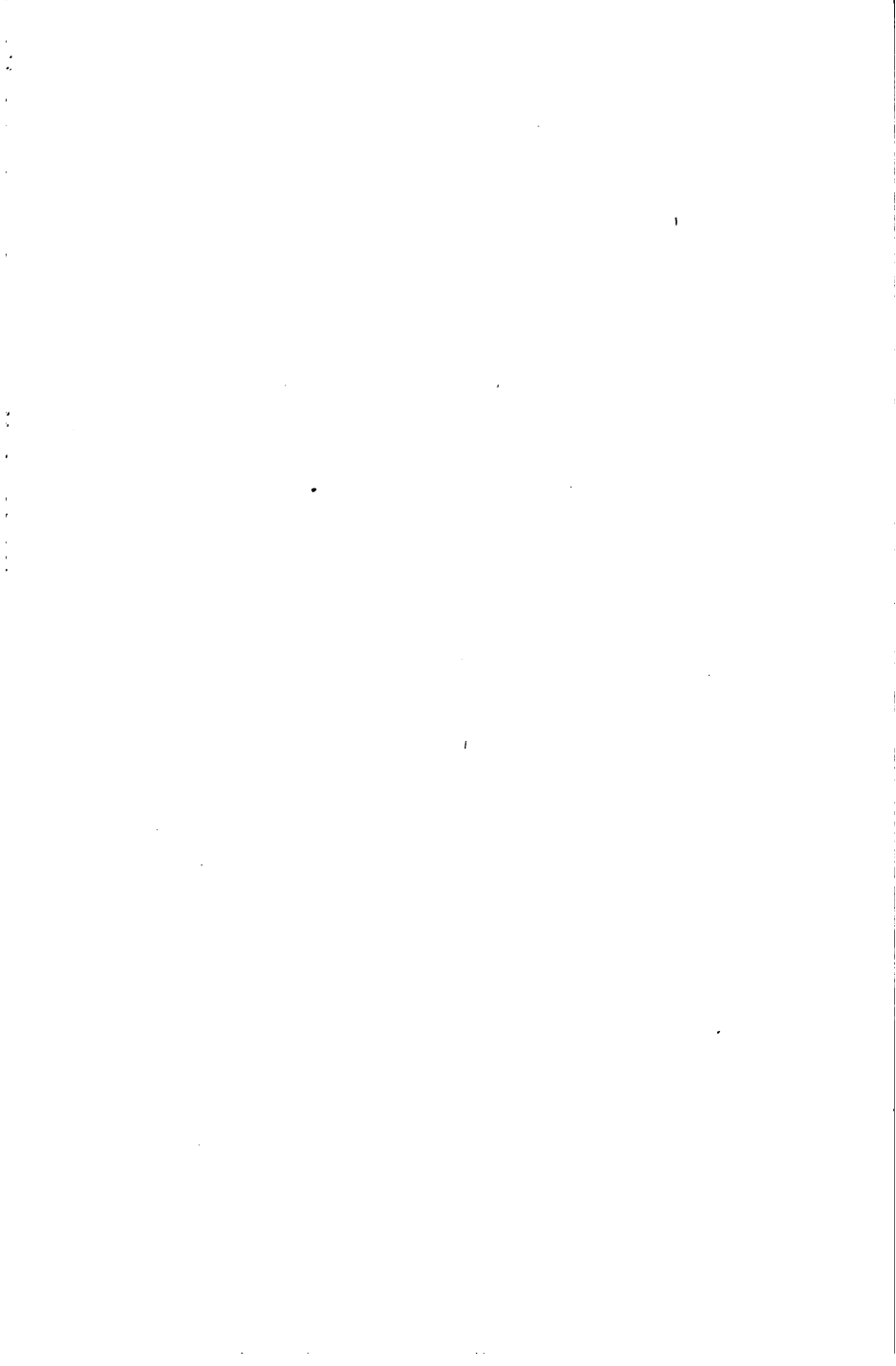
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THE EARTH'S BOUNTY





THE EARTH'S BOUNTY

CHAPTER ONE

PROFIT IN WINTER LAMBS

SINCE Mother Earth has been so bountiful in her gifts to us, I don't mind admitting that a sense of unconfessed failure prompted us to abandon city life; for we were true Metropolitan tramps, who had chased fame and fortune half over the world, and had only succeeded in gathering a few stray laurel leaves, which were fast dying for want of sufficient lucre to keep them alive.

The country home of story books, covered with roses and jasmine, had been the ideal scene of our old age. To such slothful degradation might disappointed pride have led us had finances permitted. As it was, a small

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farm where poultry, fruit and vegetables should, at least, reduce living expenses, had to be sought.

The finding of a dear, old-time homestead and twelve acres of land, amid picturesque scenery, which we could lease for three years at the ridiculously low rent of \$180 a year, somewhat reconciled us to the practical, even before we had experienced the glorious invigoration of the industrious outdoor life on a farm, where each day reveals some new interest. Impecuniosity compelled our commencing at the bottom of the ladder—a few hens, a few ducks, and so gradually through the poultry family, to the dignity of a cow; after whose acquisition the home rapidly became self-supporting, even showing a surplus profit at the end of the third year.

Of course the work was hard at first, because want of knowledge caused many blunders; but study, illustrated by daily happenings, soon furnished the practical experience which smoothed away the difficulties, and

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made me anxious to extend my experiments in husbandry.

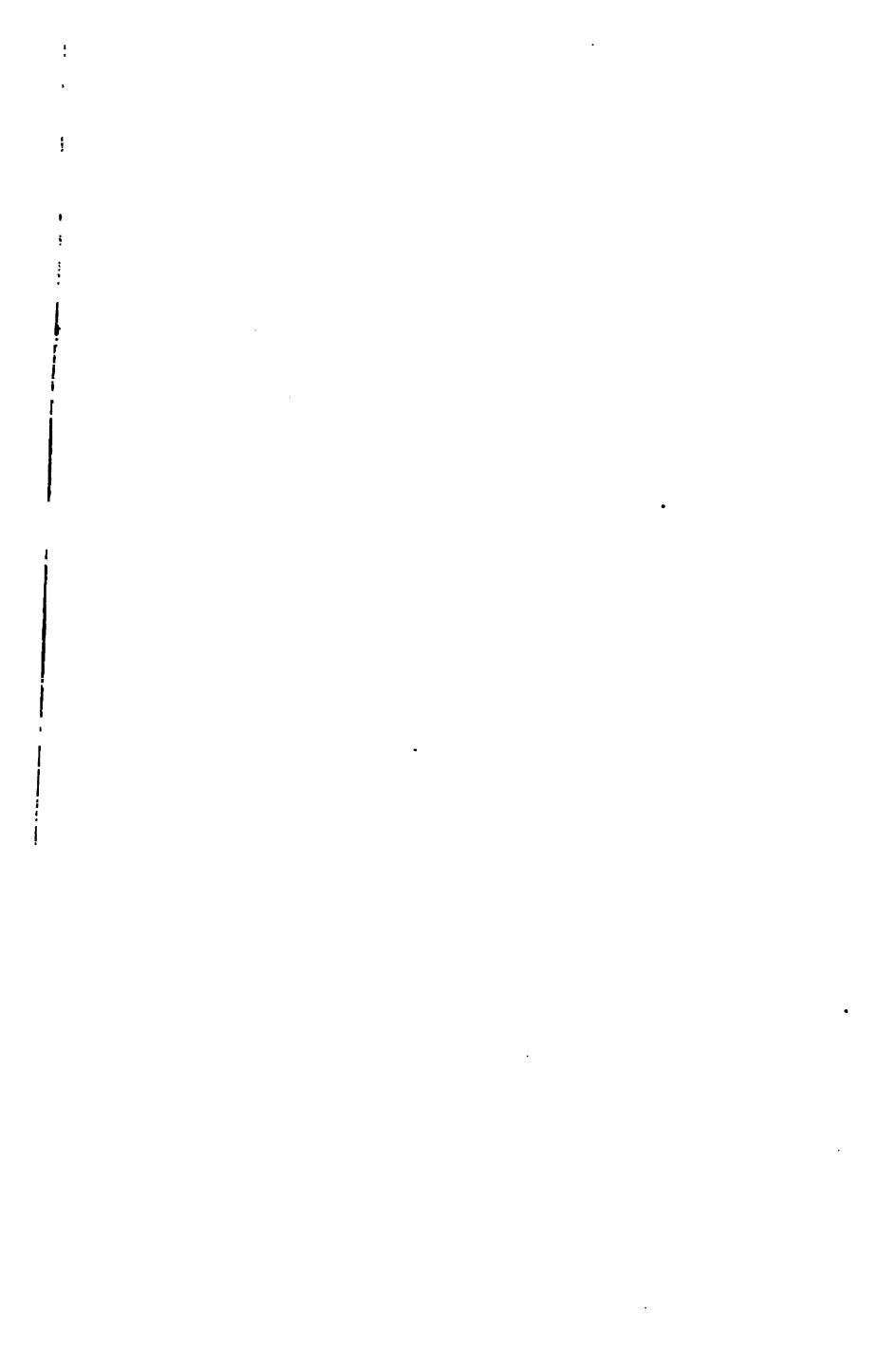
What would have happened had our twelve acres been an individual farm I don't know; for we had grown to love the dear old place so much that I believe that, if desire for progress had necessitated moving, we should have remained mere poultry people. Fortunately, the Wilbur homestead, which we occupied, and the Earl homestead, had been built before Revolutionary days, at opposite ends of a four-hundred-acre estate, by the many times great-grandfather of the present owner, for his two younger sons; and had for generations descended from fathers to sons, until some thirty years before our inroad, when the entire property had fallen to Mr. E., our landlord, who, having a large family, preferred to keep all the land in one farm, excepting the twelve acres immediately around the Wilbur homestead, which a widowed sister had occupied before our tenancy. Mr. E.'s large family had dwindled down to a

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son in Australia and a daughter in England.

Three years had turned our landlord into a valued friend and my chief adviser; so, when success had outgrown the twelve acres, he was the first to propose that I take back one hundred and sixty acres of the original land belonging to the farm. It included a large proportion of wood and brush lots, but had about eighty acres divided in pasture and cultivated ground, two outlying barns and a workman's cottage. His offer was a five years' lease, at \$20 a month, and the option of purchase on easy terms. Need I say that we accepted immediately?

The extended acreage made it advisable for me to devote all my strength and time to managerial planning and supervision, so more help had to be engaged. Sidney, my first assistant, a boy of fifteen, was still with me; and his sister had left school the year before, to become my household factotum. From them I had, at different times, gleaned parts of the family history.





"BETTY," "BAA-BAA" AND THEIR BABIES

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The father had run away from a farm home in England, to enlist in the army; been bought out; then married, and went out to New Mexico to manage a silver mine; threw up the position on falling heir to a little money, came to this country, stocked a dairy farm, failed, and gradually fell into troubled waters, through no actual fault, but just inability to manage. After some hesitation I offered them the cottage to live in, with a salary of \$30 a month, fire, wood, milk, and several other perquisites.

Mr. Fred had certainly made the most awful muddle of his own affairs, but his military training, and knowledge of stock raising, made him an invaluable subordinate on *our* farm. As for Mrs. Fred—well, she loved young animals, understood dairying, and possessed more diligent industry than any one person it has ever been my good fortune to meet. They had three younger children—two girls and a boy; so, as the cottage had only four rooms and an extension kitchen, Wally shared

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Sidney's room over the feed house. The whole family were delighted at being together, and profitably engaged, whilst I have always credited half our success to their faithful co-operation.

The first stock materially increased, under the new conditions, were sheep—which probably seemed strange, as sheep-raising is rarely undertaken by *dilettanti*, or even practical farmers, in the Eastern States, but, as in several other instances, an accidentally acquired pet influenced our selection.

Mr. E., our landlord, was an exception to the general rule, and kept sheep; but then, he was a real, old-fashioned farmer, whose ancestors had prided themselves for generations on having fine stock of all descriptions. The two homesteads were quite five miles apart by the highroad, and in different States; but a well-beaten wagon-track through the woods reduced the distance between the homes to a mile and a half.

During our second winter there, a severe

THE EARTH'S BOUNTY

cold kept Mrs. E. in the house, and gave me an excuse to spend many afternoons in her cheery living-room, being initiated into the possibilities of silk scraps, when manipulated according to old-time knowledge.

During one of these duet Dorcas meetings Mr. E. came hurrying in with an apparently dead lamb which he placed on my knee, saying:

"Here s something to your taste. It may live if you hold it in hot water. I want to try and save the mother."

And off he started, waiting only, as he got to the door, to say, "We didn't look for any lambs until March, and here it isn't Christmas. I fear I am sure to lose the mother."

Almost before he'd closed the door, I had the poor little cold baby up to its neck in a pail of hot water. Quite soon it showed signs of life, and by the time it had been rubbed dry in front of the fire, and was being fed with warm milk, Mr. E. returned, telling us

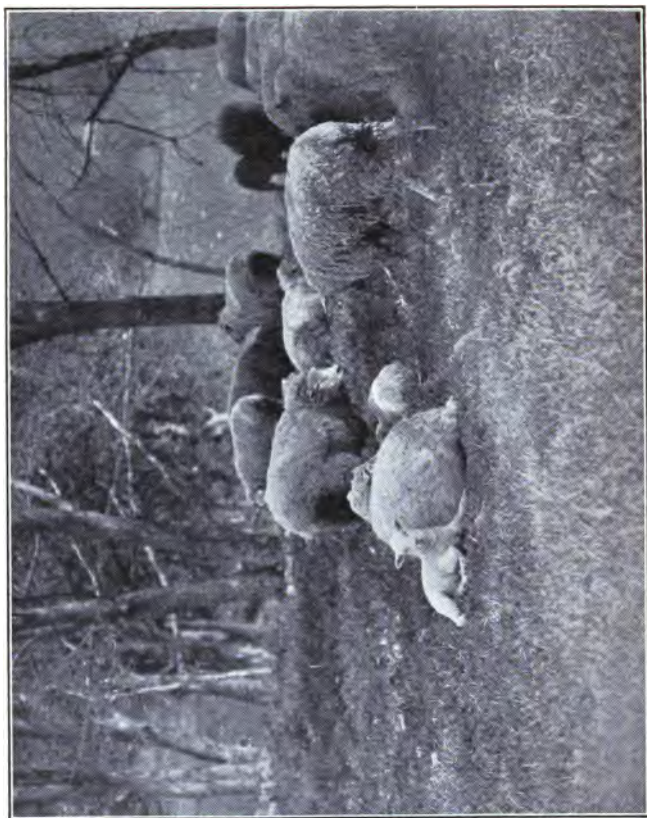
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the poor mother was dead. Later, when the baby was curled up, contentedly sleeping, on my lap, he said:

“ Say, Mother, don't you want to give that lamb away for a Christmas present? ”

Being a generous old dear, and knowing my predilection for infant creatures, she acquiesced most cordially, and I carried home the poor little chap, improvising a feeding bottle by tying a wad of cotton batting in the center of a linen handkerchief, pushing the ends into a wide-mouthed bottle, and allowing only the batting wad to protrude from the neck, where it was securely tied to prevent its being pulled out. With this most primitive substitute for a mother, the noble little creature struggled through infancy, to become chief among our outdoor pets; nor would she ever have been considered as a commercial factor had not her habit of following me about led her into a paddock on Mr. E.'s farm, where a newly acquired ram was enclosed.

Five months later, October 10th, when



A WARM OCTOBER DAY

THE EARTH'S BOUNTY

Betty was a little less than two years old, her little daughter arrived.

Lambs are always attractive and funny, with their quaint, solemn faces and elongated legs and tails; but the offspring of a pet sheep is simply fascinating, because quite fearless. Bess, a lifelong friend of Betty's, had puppies about six weeks old when Baa-Baa was born; and the antics of those babies, when at play, would have beguiled the most diligent into waste of time. But, then, it is just such stolen moments which give zest to farm life.

Baa-Baa's advent had no special significance until Christmas time, when, reading the market quotations one day, I saw that "hot-house" lambs were bringing from fifteen to twenty dollars apiece. Such prices aroused active interest. Books, pamphlets and farm papers were procured, and a course of study was in progress when the new lease was signed, that made personal experiment possible.

In March five sheep were bought, at six dollars each; Mr. E.'s Dorset ram was hired for

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the first two weeks in May, at a fee of five dollars; and the following January there were seven lambs for sale, which realized \$100. Betty had twins that year, and they were included. Feed had cost, as nearly as we could estimate it, \$4—making the entire outlay \$39; profit \$61 and Baa-Baa, though I suppose Betty's last two lambs should not be included in the calculation. But even if they are debarred by strict justice, there would still be \$31 to the good.

There are two indispensable requisites for this comparatively new departure in sheep-raising. First, a well-ventilated barn; secondly, the right kind of sheep. Our cow barn, being very large, and built in the old-time fashion of half-closed stables at the back of a deep, open-fronted shed, covered by a high roof and haymow, enabled us to provide the first with little expense or work.

A partition, four feet high, was run across the shed, for which slabs were used, which cost, at the saw-mill, only \$4.40. Then three of the

THE EARTH'S BOUNTY

stables were thrown into one, making a general sleeping place, twelve feet deep and thirty feet long. Two more of the stables were subdivided, by movable partitions, into pens in which to segregate sheep at lambing time; which gave us ample space for the proposed flock, as the general estimate is twelve square feet to a ewe. Three hot-bed sashes were let into the end of the shed, and two into the large sleeping compartment, as the original windows were only two feet square. Probably these additional windows were not essential, but light and sunshine are one of my fads, and we had lots of sashes, bought at an auction sale some time before. Two racks for fodder, two shallow troughs for grain, and one deep one for water constituted the furnishings of the fold, and cost only three dollars for timber, as Fred made them.

The second essential was more difficult to satisfactorily arrive at, for the books we had all discussed sheep farming from the old standpoint of mutton and wool—a branch of

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the industry which the Eastern farmer, with his restricted acreage, has had to concede to the Western ranchman, whose vast holdings of cheap pasture permit his making a profit at prices quite beyond our Eastern competition. Even the farm papers had little reliable information on the subject eleven years ago, but a short account in an English agricultural magazine mentioned the fact that a Mr. Somebody, who was making a specialty of raising lambs for the Christmas market, considered a flock of Dorset grade ewes, headed by a pure-bred Dorset ram, insured the best lambs. As Baa-Baa's father was a splendid gentleman of that ilk, we did not worry about tracing the family history of the first five sheep of experimental days, only being careful to select healthy-looking animals of approved shape, which an authority describes, as nearly as I can remember, as follows:

“Ewes should be a good average size, well proportioned and symmetrical. A feminine head, clean-cut nostrils, bright eyes, small

THE EARTH'S BOUNTY

neck—long and thin as compared with the ram's, strong shank with good heart girth, well sprung ribs, back slightly arched, with well-filled hips and straight legs."

As the results seemed satisfactory to our ignorant judgment, the next year's additions to the flock were selected in the same way; but subsequently, the superiority of Dorset—or, at least, good grade Dorsets—as breeders and mothers was so fully demonstrated, on our own and other farms, that, for the last few years, none other have been tolerated. (Excepting, of course, Betty, who is still the leader of the flock, though Baa-Baa wears a bell also, and ably assists her mother in marshaling the flock around.)

I have always excused the presence of my innumerable pet animals and birds by my belief in their value as decoys in managing others of their kind; but never have I seen it demonstrated so forcibly as in the case of sheep. Betty and Baa-Baa, having been brought up with dogs, had entirely lost the

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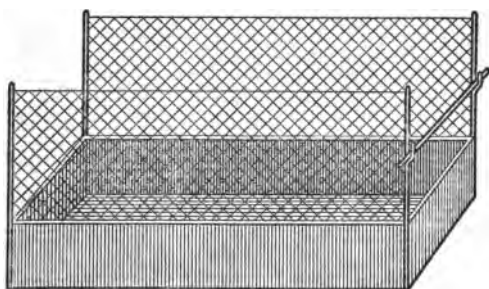
sheep's instinctive dread of the canine race, and their placid fearlessness seemed to be transmitted to the whole flock if a strange dog got into the pasture, for they would stand and stare at him until he departed in a state of mystified astonishment. Not one dog in a hundred will attack sheep unless they run, so my advice is: commence sheep-raising with a baby lamb, who can be trained to associate with the house dog, and come when called.

Though Dorset grade ewes are almost as satisfactory as full bred, the ram must be as pure-bred as it is possible to find, and will cost about \$100. Our Sultan was brought direct from West Stafford, Dorset, England, and was a beauty; but now there are several herds of pure Dorsets in this country, and there is nothing gained, and much cash lost, by importing.

The ram's quarters should be some distance from the sheep-fold, but his comfort must not be neglected. Provide a dry shed, with ample room for exercise during the winter, when pas-

THE EARTH'S BOUNTY

tures are covered with snow. He must be kept in good condition, but never allowed to grow excessively fat. From May until September a good pasture, and just a handful of oats, or oats and bran, at night, will keep him vigorous and strong. From September until



THE GANGWAY FOOT BATH

April, feed corn fodder, oat straw or hay, in rack, night and morning, and increase the grain rations slightly as the winter advances. April and May he can have a quart of oats and wheat, and about two ounces of linseed meal, or oilcake broken up, and all the green food and hay he will eat. In May the ram is taken to the sheep-fold in the morning, after

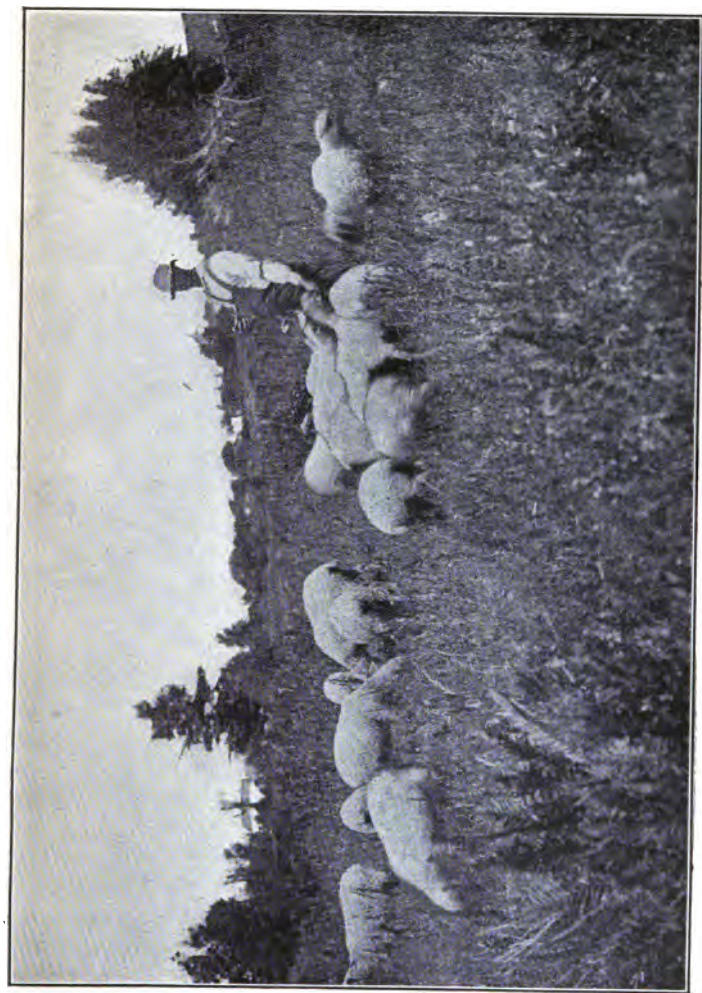
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feeding, and returned to his own stable for supper. Fresh water and rock-salt must be accessible at all seasons of the year.

From February until the 15th of April the ewes have rather short rations, consisting of hay, oat straw, oat hay, pea straw, and corn fodder. From the 15th grain rations commence, starting with about a handful of oats for each animal at night, and running up quickly to a pint night and morning, of oats, oats and bran mixed, and about a tablespoonful of linseed meal. Some root or ensilage should also be included in the daily feed. The object of this rapid increase of food is to bring the ewes all into season, as nearly as possible, at the same time, and is termed "flushing the ewes."

If you have a good pasture, put the sheep on it late in April, for a few hours in the middle of the day, as the exercise is conducive to health and vigor, and it does away with the necessity of feeding the ensilage.

During May, the man in charge of the



IN PASTURE TIME



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sheep should go through the flock every morning, and select a few ewes to be kept in for the day, before allowing the majority of the flock to go into the pasture. Then, if the ewes have been numbered when first bought, as they always should be, the number of each ewe kept in the fold can be recorded day by day, and will furnish a guide as to time of lambing, which occurs about twenty-one weeks later. When the number of every sheep in the fold has been recorded, the ram's daily visits to the fold must cease, of course, and his heavy grain rations can be gradually cut down; but at no time must he be allowed to fall out of condition.

After the breeding season ewes require good food, but not fattening. From June they have, with us, a shady pasture in which there is a running stream. When the grass commences to fail rape is fed in the yard, night and morning, and the grain ration of bran and oats started. As the lambing time approaches, the ewe's condition must be watched

THE EARTH'S BOUNTY

closely, and rations balanced accordingly; for climatical variations, from year to year, affect crops so materially that nothing but personal observation of the stock can be accepted as a safe guide for the relative quantities of dry and succulent food.

As the sheep indicated by the record numbers and dates fall due, they are placed in the outer pen of the fold, and carefully watched, though it is seldom a sheep needs assistance. After the lamb, or lambs, are born, it, or they, and the mother are confined in the small pens formed by the movable hurdles, where the shepherd's supervision is still necessary, as lambs occasionally have to be encouraged and helped to seek nourishment; in which case start the ewe's milk flowing as you would a cow's, and coax the lamb to her. If it is still obstinate, take a little of the milk and feed it with a spoon.

The day after lambing, give the ewe about a pound of chopped pumpkin, which possesses properties of special value at such times, and

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can also be used in larger quantities advantageously whenever other root crops are being fed, though excess must be avoided before the lambing season, because of the danger of over-feeding. On the third day, if the lamb is nursing properly, and everything seems right with the mother, they can both be turned into a larger stable, and the ewe's rations gradually increased. Cabbage, carrots, turnips, and bran are all milk producers, so must form a liberal percentage of the food, as on the supply of milk depends the fattening of the lambs, which, to catch the best prices, must be in prime condition for market in December and January—eighty or ninety days from birth.

When the first lambs are between two and three weeks old, a pen is constructed of hurdles, in which there are openings ten inches wide, and in this is placed special feed for the lambs, which at first consists of a little bran, night and morning. Then coarse meal and hulled oats, coarsely ground, are added; also a rack of clover hay; and, as they get stronger

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and need more nourishment, a trough of skim milk will help them to prime condition, as it does broilers. Lambs never seem to touch the rock-salt provided for the ewes, so a little coarse salt is mixed with their grain.

To insure early pasture, and succulent food for fall and winter, some special crops must be grown. Winter rye and oats come in first, and a patch of rye will last for years, if never allowed to grow above the second joint. Sheep should be turned on it early, as they dislike it if the growth becomes rank. After it has been well eaten down, shut off the sheep, and it will make fresh growth. Rape grows rapidly on good ground, and if sown in May, the first cutting can be made in June, second in August, third in September. We never turn the sheep on to the rape, preferring to feed it in the fold, where the quantity eaten can be controlled. Soy beans and Canadian peas are also sown to cure for hay, and are among the best feeds for lambing ewes. Sweet turnips, carrots, pumpkins and mangel-



CHAMPION DORSET RAM AND EWE

THE EARTH'S BOUNTY

wurzels are all required in plentiful quantities after lambing, and so must not be neglected.

Disease has formed no part of our personal experience, but rigid preventatives are always in use, such as thorough cleanliness and disinfecting the fold, clean, wholesome food, pure water, and a monthly foot bath of permanganate of potassium—for which purpose Fred made a trough of inch boards, six feet long, two feet wide and one foot deep. Above the solid sides poultry netting two feet wide was fastened, which made the trough into a sort of gangway; and in such a way it is used, when needed, being placed against the doorway of the sleeping compartment, so that the sheep must pass through it on the way into the outer compartment of the fold. Many of our neighbors laugh at the last preventative, but they have not lived in Australia, where outbreaks of foot-rot are the ranchman's scourge.

There are two sources of profit, in this most

THE EARTH'S BOUNTY

profitable branch of sheep keeping, rarely calculated—wool and manure; yet the first will add at least \$75 to the yearly income, if only fifty sheep are kept; and the latter is of immense value to the farm.

CHAPTER TWO

WINTER VIOLETS

To the majority, violet culture on the practical farm may seem an incongruity; but, in our vicinity, custom has removed the stigma of oddity, commercial enterprise being equally divided between dairy farming and hot-house floriculture—the latter industry having gradually spread from its original village boundaries to the outlying farms, until conservatories in close proximity to old-fashioned barns excite no comment.

Of course such a fascinating occupation would have been seized upon at once as the most congenial means of supplementing our income, had not the exchequer vetoed fundamental outlay; but as it did, most emphatically, we had to turn our commercial thoughts in other directions, and restrict our floral am-

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bitions to the limitations of window culture.

The casement faces southeast in the living-room, and is broad and deep—a perfectly ideal place for plants. Geraniums, fuchsias, and even roses joyed our hearts by blooming all through the winter; but the violets just sulked; at least, I know no other way of explaining their condition. They seemed healthy, but the flowers were few, and had a hungry, discontented look. The roots were examined for worms; special plant food was supplied; then the masculine mind of the household conceived the idea that the atmosphere of the room was too dry, and skimped lunches for a week to bring home a large fern glass for them.

Even then they didn't seem contented; so the next winter we took the advice of a friendly neighbor, and made a case to fit into the window of a small room over the kitchen, which was always comfortably warm, as the chimney ran through it. The case was only a rough board arrangement, two feet and a half long,





A PERFECT LEAF AND FLOWER

THE EARTH'S BOUNTY

two feet wide, with sloping sides and a glass cover, like a small hotbed, in fact; but we had really nice, healthy, fragrant flowers from December until March for two years.

Then the general enlargement of the farm brought about, among other things, the reconstruction of the brooder house; for several years' experience had convinced me that individual brooders were better and more economical for the infant chicks than the continuous pipe system with which the house had originally been fitted. This alteration threw the heating apparatus of a twenty-five-foot house out of commission, so the idea of a conservatory immediately suggested itself for consideration, and was quickly carried out, though I suppose "glass shed," and not "conservatory," is the term for the building we erected.

The stove and boiler were already stationed in a dug-out compartment between the brooder and feed houses, which ran from east to west, facing south. To minimize cost, we concluded

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to build a lean-to shed of glass in front of the feed house, which would serve as a back wall, and afford shelter from the north winds. Mr. Fred and Sidney, both being handy men, undertook the building, which was no more difficult than a hen-house.

The feed house was eighteen feet long, so, of course, the "conservatory" had to correspond. A strip of 2 by 4-inch sawed cedar was nailed across the front of the feed house, seven feet from the ground, and strengthened by four posts of 4 by 4-in joists, set one and a half feet in the ground—one at each end, and two five feet apart; all nailed to feed house wall. Full length of posts, eight feet and a half. Four front posts, of same, five feet and a half long, to be set one and a half in the ground. Two posts for middle supports in ends of house, six feet long. Thirty-nine feet of joisting, for front and ends of ridges. Four rafters, $2\frac{1}{2}$ by $2\frac{1}{2}$ -inch scantling, twelve feet long; one of same for center, fifteen feet long. From half a foot below the surface of

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the ground, to one and a half above, the front and ends of the house were boarded up solidly, and took seventy-eight feet of 1-foot 1-inch hemlock boards for the inside, and about fourteen 6-foot slabs for the outside. The latter were cut into 2-foot lengths, and made quite a pretty rustic base around the house. The rafters were grooved to the depth of a quarter of an inch, to make a support for the sashes.

For the roof ten ordinary hotbed sashes were used. For the front, above the solid base, three real conservatory ventilators, two feet wide and four feet long, were used. The woodwork and one row of nine-inch lights filled in the remaining three feet of the entire fifteen feet of length. The ends of the house were all glass, and consisted of three graded frames for each end. (The lumber yard in the next village, being supported almost entirely by florists, made special graded frames and grooved scantling.)

The building, extending from the front of

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the feed house, covered the windows, so one of them was utilized as a door, and was the only entrance to the conservatory, the inside fitting of which consisted of a bed foundation, twelve inches deep and five feet wide, all round front, ends and back, excepting, of course, the three feet occupied by the door. These foundations absorbed one hundred and eighty-eight feet of 1-foot boards and fifty-six feet of 4-inch scantling, for posts and supports.

The stove and boiler being in place, the only necessary change consisted in readjusting the elbows, to allow the pipes to be carried across the corner of the feed house and round the conservatory.

It is impossible to give an accurate estimate of the cost, because no extra labor was employed actually for the house itself, though we got a man from the village, at a dollar a day, to help out with the general farm work for a week. And then, of course, lumber was much cheaper seven years ago; and our old account book simply says: "Cost of violet house, \$78,"

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which is not very enlightening; but, never having thought about chronicling our home affairs for public perusal, accounts were kept in a primitively collective way.

When the house was finished, having no properly prepared mold, three loads were bought, at a dollar a load, from a man who had more than he needed. The plants cost fifteen dollars, and coal, for the entire season, eighteen—which brought the outlay up to \$114.

The first season we marketed one hundred and eighty-five bunches of flowers, at sixty cents each, which left the house three dollars in debt. However, the following year, the principal yield of flowers came in December and January, when they brought a dollar a bunch; and there was an increase of fifty bunches, making the return for the season \$175, against three dollars debt and twenty dollars for coal, which left \$152 for labor and profit.

Labor can't be counted, as the floral business was not attempted until the farm pros-

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perity permitted my husband's remaining at home and devoting himself to a long-cherished piece of literary work, which became so dangerously absorbing that, for health's sake, some counterbalancing interest and vigorous physical labor had to be invented. All being fair in love and war, I considered it a justifiable deception to have the conservatory built, stocked, and then, at the most critical time, discover that I had undertaken more than I could manage. The scheme acted beautifully, for the dear man's love of plants, and desire to help me, led him to desert his desk for several hours a day, until he gradually became honestly interested, and assumed entire care of the plants, leaving only the stoker's work to Sidney, who had mastered all the idiosyncrasies of the heating apparatus during the two years it was in use in the nursery section of the brooder house.

After the house, the first requisite in violet culture is the mold in which to grow the plants. It must be of medium consistency—

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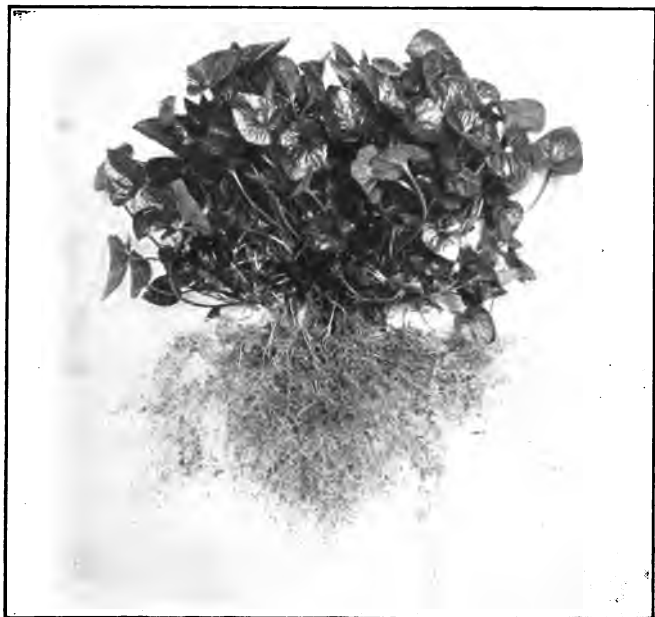
that is, neither heavy and clayey, nor light and sandy, but a happy blending of both—and fibrous in character. The latter requisite is best obtained by using the residue of old turfs.

Following the usual custom of large growers in our vicinity, a strip of meadow, in which there is a good percentage of clover, is mowed in September or October; then plowed to a depth of three and a half inches. The sods are sprinkled with lime and left until December frosts have had an opportunity to kill embryo weeds and insects, mellow the earth, and hasten the disintegration of the roots. Early in February and March, just as weather permits, the sods are carted to an open shed at the back of the feed house, which is built of cedar poles and slabs. During September the droppings from the gutter in the cow barn were collected each morning, to avoid their becoming mixed with straw or bedding, and stored under the shed, so that they should be in condition to mix with the sods in making the compost.

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The manure being collected in its pristine strength, and kept under shelter to mitigate waste, a very small percentage was used—a one-inch layer being alternated with a four-inch layer of sod in the construction of the compost heaps, which are made three feet wide and four feet high. The entire mass is thoroughly forked over and restacked two or three times during March and April, to allow the escape of foul gases, and to assure a mellow condition by May, at which time the coarse screen belonging to our concrete outfit is set up on four posts in the shed, the compost is passed through it, a few pailfuls being put in at a time, and raked about with a forked hoe. This process effectually breaks up any remaining clods, the screen being the size used at stone crushers to divide the first and second gravel. The fine roots and broken particles all pass through, supplying the fibrous qualities; but the heavy roots and stones are held back.

As screened, the mold is put into a wheel-



**A STRONG, HEALTHY PLANT, WHICH BEARS 131 FLOWERS
IN A SEASON**



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barrow and taken around to the front of the house, where it is shoveled in through the windows, or, as florists designate them, ventilators. When the bed-frames are quite full, they are raked level, then *gently* smoothed off with the edge of a strip of board just long enough to reach across the bed.

Transplanting is done at once, before the soil has time to settle. We always grow the young plants in boxes which are easily handled, so the work is quickly accomplished. The plants are watered about half an hour before they are carried into the feed house, where a small kitchen table acts as a potting bench. Any dead or sickly leaves are trimmed off, and then, with a sharp knife, the soil is cut through in each direction between the rows, to sever the rootlets, and make it possible to scoop out each root with its accompanying wrapping of moist earth, and slip it gently into the hole made ready to receive it in the permanent bed. This prevents the change of environment being a shock, as it must be when

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the earth is allowed to fall away from such fragile roots.

The plants stand in rows nine inches apart each way, when the beds are completely filled, which is always before the end of May in our neighborhood. At this time the sun has gained so much strength that the glass roof has to be given a coat of whitewash to soften the glare; and the frames are entirely removed from the ends of the house, double mosquito netting taking their place, which affords some shelter, yet allows a free current of air. The ventilators are similarly covered, for we are firmly convinced that by excluding moths and other winged insects, the plants are effectually protected against innumerable pests, such as saw-fly, gall-fly, maggot, etc., all of which cause trouble and jeopardize success.

The whitewashing was neglected until after the house was in use the first year, but since then it has always been done before the earth was put in.

Unless the weather is very hot and dry at

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the time of transplanting, it is better not to water for forty-six hours, by which time the soil will have settled sufficiently to prevent the roots being disturbed; but, of course, conditions must control, as they invariably do, all such matters.

My dear "gardener man" has a comprehensive sympathy with plants that guides him to apparently daring risks sometimes. An expert violet grower was in the house one day and remarked, in an insinuating way, that the beds looked dry; to be told by the man of instinct that the earth would have to wait for a drink until the plants said they were thirsty—which, I have no doubt, sounded like tomfool idiosyncrasy to the old grower; but really it was unconscious perspicacity, for there are times when even moisture-loving plants like violets derive benefit from an abstinence, which at other times would cause them to droop and die. It is the gift to discern just such uncertainties of appetite in animal and plant life that makes the really successful

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farmer; but, until the amateur is sure of possessing the instinct to *feel* such wants, it is better to follow generally accepted rules. The one given us by all authorities on watering violets is to keep the beds moist, without ever allowing them to become wet.

Until we had the hydraulic ram put into the spring, to force water up into the farm buildings and hot-houses, spraying would have been a difficulty had it not been for Sidney's suggesting the knapsack spraying outfit, which idea was hailed with joy by his master, as it facilitated the work; and the weight of water, being suspended from the shoulders, proved a splendid counteraction to the stoop of desk work.

This same spraying machine was filled with soapsuds once a week for the first month or six weeks, after transplanting, and every leaf thoroughly sprayed above and below, as a safeguard against the red spider. Best white soap was used, and the suds made quite strong. It is surprising how rapidly this pernicious

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work can be accomplished, when familiarity has made the handling of such fragility an easy task.

After the middle of October spraying the foliage is omitted entirely, water being supplied only to the roots.

Heat and ventilation commences to be a problem as the season advances, for violets must have quantities of fresh air, and cannot stand much heat; therefore, forcing them for winter blossoms presents difficulties not experienced with other hot-house plants. To supply fresh air in a conservatory, when the outside air is below zero, requires the exercise of much gumption, especially as the house thermometer should never go above sixty degrees—and five lower are to be preferred—in the daytime; during the night forty degrees is maximum. B. T. Galloway, to whose valuable book we owe much of our success and pleasure, gives, as a safe standard, ten degrees above freezing.

Cultivation of the beds commences when the

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plants are set out, and must never cease until the foliage covers the surface. A small hand-rake will keep the soil light and kill embryo weeds, if it is used diligently. A weed, a dead or faded leaf, should be considered a disgrace.

Runners and stray flowers will commence to appear on some of the plants in August, and must be removed as soon as noticed, for they steal strength from the main plant, which needs all the reserve vitality it can gather for the blossoming season.

About the first of September horse manure, which has been collected early in the season and repeatedly worked over with a fork until thoroughly pulverized, is spread over the beds—just a thin layer—and worked well into the soil. This is usually the last cultivation that is possible, as the foliage develops so rapidly after the dressing that the soil is soon completely covered.

The flowers should start in November, and keep abundant until April. The first warm days great care must be observed to keep the

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house cool, for an excess of heat will cause an abnormal rush of blossoms and spoil the supply for Easter, when prices go up as high, or sometimes even higher, than at Christmas.

When the season is over, which is usually toward the end of April, the old plants, on which so much care has been lavished, are ruthlessly torn up; for the poor little victims can only be profitably forced to winter flowering for one season, and even during that short period of time disease is so liable to attack them that, to prevent infection, they are cremated on a fiery bed of cedar boughs. Conforming to this most necessary edict of commercial violet culture is, to us, an annual regret. The soil is also removed to a depth of six inches, carted away, and spread broadcast on some field to be plowed up; the house cleansed, fumigated, and refilled as at the commencement.

PROPAGATING

Confiscating the old plants each season of course necessitates raising young ones to take

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their place, so that at least one half the year's work consists in propagating and caring for the young plants.

There are many varieties of violets, and as many methods of propagating have been in vogue in the past; but the varieties grown under glass for winter flowers have narrowed to the Lady Hune Campbell and the Marie Louise, for blossoms, some florists adding a few plants of the Dorsett, a single flowering variety which develops an abundance of well-shaped leaves with long stems, which constitute their chief utility to the commercial grower; though there are indications that the single violet is coming into fashion again, and if so the Dorsett will undoubtedly be the favorite.

Our experiences have been with the three above-named varieties. At first the Campbell and Marie Louise constituted our stock, and different methods of propagating were followed. Subsequently the Campbells were dropped, and about one hundred Dorsetts to every one thousand Marie Louises were grown, to insure

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a plentiful supply of leaves to garnish the bunches without robbing the Marie Louise plants, which should be allowed to retain their foliage all through the flowering season, as it supports the blossoms, which are prone to spring from the side of the crown (center of the plant), and their own weight will bear them on to the soil, if not protected by the leaves.

Of course, to establish the beds, plants old enough to be set out had to be bought; but such extravagance is not permissible, nor advisable, when there is a foundation stock to multiply from.

From the 1st of February to the end of March is the time to start the nursery trays, which we make out of laths and two strips of board one inch thick, three inches wide, and fourteen inches long for each end. Cut the slats in half, and nail two, a quarter of an inch apart, on to the strips of board. Then put on two laths (one slat cut in half) for the sides, and the tray is made. Spread a layer of pot-

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ting moss to prevent the contents running through the open spaces, which cannot be omitted, as they are needed to supply drainage and air.

Sand is the correct filling for the trays, and nothing else is quite as good; but, unless the sand can be got from a clean sand-bank, it is safer to use earth from the compost heap, mixed with one-third more light soil; for sand that has been exposed to all sorts of contaminating influences will contain objectionable qualities.

Prepare quantities of the trays according to the amount of plants desired, remembering that all cuttings will not make strong plants, and allowing goodly surplus to avoid shortage at bedding time. Each tray will hold about one hundred and eighty shoots, and each old plant will average ten; so approximating the supply and necessary tray space is not difficult.

In February the beds will be covered with foliage. Divide the leaves carefully, and several offshoots will be found nestling under

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each parent plant. These babies usually have a goodly supply of rootlets, though they rarely penetrate the soil, being nourished merely by the humid atmosphere of their semi-dark retreat. Put a layer of wet moss at the bottom of a covered basket or pail, and then with a sharp knife sever each shoot from its parent, and drop it immediately into the basket; otherwise they will wilt before sufficient have been collected to fill a tray.

The sand must be moist and firmly pressed down in the tray. Take each plant out of the basket and trim off most of the rootlets, also the larger leaves, and plant immediately, an inch apart, in the wet sand. They must not be exposed to any direct light or allowed to become dry. As the trays are filled, we stand them on a shelf, which was purposely added, under the beds the second season. The position is most favorable for the first few weeks, but when the work is being carried on on a large scale a special shed should be built as a nursery.

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No matter where the trays stand, they must be well shaded. It takes from six to eight weeks for real rootlets to develop, during which time more trays, about eight inches deep, must be made on the plan of the first set, only using simple slats instead of the laths, putting first a layer of moss, then half an inch of coarse coal ashes, an inch of fine ashes, and fill to the top with earth from the compost heap, which has been screened through a finer sieve than that used for the house.

Use the greatest care in transplanting babies to their new homes, which, when filled, can be set outside in cold frames if there is no nursery house. As before, they need shade; but more light, and plenty of fresh air.

The brooder houses are getting empty by the time this second planting takes place, so we tried setting trays in there, putting two into each window; but it was not a good plan. The plants need top light to make uniform growth, so the next makeshift was a narrow bench in the house itself. Still later the original house



THE NEW VIOLET HOUSE



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was given over to nursery work only, and the beds were used as benches on which to stand the trays, which "our gardener" prefers to using the beds themselves, even for the second planting.

Spraying has to be attended to regularly three times a week, to keep down the red spider. The plants remain in the second trays until transplanted to the permanent beds in May.

DISEASES

If healthy stock is procured to start with, the gardener virtually controls the situation, as strict cleanliness in the houses and observant watchfulness which notes any odd appearances of flowers, leaves, or roots are the most potent checks to disease.

A plant with curled or spotted leaves, or ragged flowers, should at once be removed, for these are symptoms of disease which, if neglected will become epidemic.

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SPOT

is the most prevalent of violet diseases—in fact, authorities say that the fungi from which it originates are always to be found where violets are grown; therefore it must be fought, even when not perceptible, for it will demolish a whole houseful of promising plants in a few weeks if neglected.

The first visible symptoms are little watery blisters on the leaves and a faint, sickly odor, which can easily be noticed the first thing in the morning before the house has been ventilated. Any woman who has experienced the disagreeable consequences of a neglected vase of flowers will be able to detect the odor of spot, which often attracts attention before the disease has been noticed on the leaves. From a speck no larger than a pinpoint the blister will grow in rings varying between sage-green and yellow in color. Humid weather, or a damp, badly ventilated house, will develop the spores, which look like minute hairs. These

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atoms float about in the air, eventually settling on some plant; and, if the foliage happens to be wet, it makes a congenial home, and the pest grows and develops another spot. That, in turn, will propagate thousands of spores.

There is no remedy for the disease except prevention and instant destruction of every affected leaf. The first depends principally on intelligent spraying, which means choosing bright days, and concluding the bath by eleven o'clock, so that there is plenty of time for the leaves to dry before evening, and eventually withholding the water from the foliage after October 1st. The second is covered by watchful care and cleanliness. No half-dead leaves or flowers must be thrown down to decay in the house, for if they do, they will surely develop the fungi which cause the spot. Burning is the only safe way to dispose of waste matter.

There are several other leaf troubles, such as Wart Disease, technically called Œdema;

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Scald, or Edge-burn, other fungi which cause the leaf to become soft and slimy.

The flowers and roots have some special diseases, but, as doctoring is of little use, and they all spring from fungi or parasites which are developed by indiscreet watering and ventilation or untidiness and general slipshod methods, there is really no use in wading through several descriptions of diseases whose remedies are a reiteration of the cautions already given.

MARKETING

The usual market bunches contain fifty flowers and a border of leaves. Both must be gathered with stems as long as the plants will allow. It requires care not to injure the developing bud when removing the full-blown flowers from the crowns.

The ordinary custom is to make up perfectly circular bunches, the flowers being closely and evenly grouped and garnished with a collar of leaves. Needless to say, faded or misshapen

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leaves or blossoms should be rejected, for one or two blemishes will ruin the entire effect, and if a commission man or wholesale dealer sees such defects, the consignment may be condemned as inferior.

As with all produce, the attractive-looking wares please the eye, and are given the best places. One florist takes all our flowers, and, as his customers are wealthy, fashionable people, I persuaded him to try a few innovations one winter, which were so successful that he has a list of special orders to be filled every day during the winter at special prices.

Instead of the circular bunches, we made them up with one side higher than the other, so that, when worn, the beauty of the entire bunch showed fully. Oblong sprays, to be worn with evening dresses, and some egrets for the hair, were among the oddities of shape supplied.

We pack twenty-four bunches in *papier-maché* telescope cases, and even in the most severe weather have no trouble about freezing,

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as the large rose growers in our village and several other places on the road to New York made an arrangement with a man some years ago to run a sort of private brigade, using large vans provided with heat, in which the boxes are collected from the different green-houses and driven straight to New York during the night, and delivered to the wholesale house without any exposure or change of temperature, as is the case when shipped by railroad. Growers living in a neighborhood where there is no such convenience will have to exercise special care in boxing violets in the winter, as they are easily frozen.

CHAPTER THREE

TILLAGE AND ROTATION OF CROPS AS RE- GENERATORS

AFTER taking over the whole of the Wilbur farm lands, we had about one hundred and five acres of what had been tillable ground, the return from which was so unsatisfactory that it seemed safe to risk trying some of the methods of tilling and cropping which were being reported by experimenters as successful. Such an affront to traditional custom would, in all probability, have caused mutiny and desertion had our help been really, truly bucolic; for the ordinary farm man is so bigotedly devoted to his forefather's blunders that, even when he takes an intelligent interest in the world's general progress, he scoffs at agricultural improvement, and cannot be depended upon to give a new idea an honest trial. Fortunately

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our Mr. Fred's reverence for ancestral achievement had dwindled during his wanderings, so he was amenable to reason, and willingly gave everything we elected to try a fair chance.

Our holding, like the majority in the neighborhood, was suffering from indiscreet tillage and cropping. Past generations have labored under the impression that if corn, potatoes, or cabbage "done fine" on a certain patch of ground, they had an affinity for that particular spot, and there they were planted year after year.

In pioneer days the virgin soil contained such a bountiful supply of plant food that it endured many seasons of man's mismanagement before showing signs of the ruin which was being wrought. The decline was so gradual at first, that it was only when climatical conditions were adverse, that the soil's inability to nourish crops was noticed with any alarm. Then the farmer did not blame himself or his forefathers, because his want of knowledge prevented his realizing that they were at fault.



HARROWING THE SECOND TIME

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Naturally, conditions grew worse in subsequent years, and the wail about "no money in farming" was taken up by the younger generation as an excuse for deserting their holdings. The influx of country youths to city offices and stores commenced. The increasing number of abandoned farms started the Government on a course of investigation. Soils were analyzed by experts, experiments were tried, and many beneficial facts discovered which, when taken into general use, will assuredly restore fertility to the fields made barren by man's ignorance of nature's laws.

But there! What's the use of railing at the past? Our wonderful improvements of to-day and to-morrow will, in all probability, be regarded as pitifully primitive one hundred years hence, and, after all, the farmer has been no more carelessly profligate with the soil's powers than the city man with his mind and body. Nature's laws are virtually the same for all living things. Exercise, rest, food, drink, and air are all equally essential; excess or insuf-

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ficiency of any one dangerous. Our business man overtaxes mind and body, and, like the soil, gradually breaks down and tries for the simple life he deserted in youth.

It seems such a pity that old Father Time does not prevent the pendulum of affairs taking such desperate plunges. A nice, even wigwag would save poor humans lots of sackcloth and ashes, though my grandmother may have been right in saying that "from the ashes of repentance springs the spirit of improvement"—which is certainly appropriate to the present agricultural improvement.

The necessity for some knowledge of soils is very apparent when we realize that there may be several distinct qualities on one farm. The Wilbur tillable land was divided into three kinds: First quite a good, rich, black mold, then heavy and sandy. A ten-acre field of the heavy character had been plowed shallow for years; in fact, our dear old landlord had a horror of deep plowing, and, when I quoted a Cornell professor as an authority for thinking

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that it would benefit that particular field, he boiled over with indignation.

“ See here, Mrs. Saint Maur, you have done fine with hens and such things, but you’ll run yourself and the farm to the devil if you take up with all the quackery that is put together by rogues that don’t know a plow from a toothpick! ”

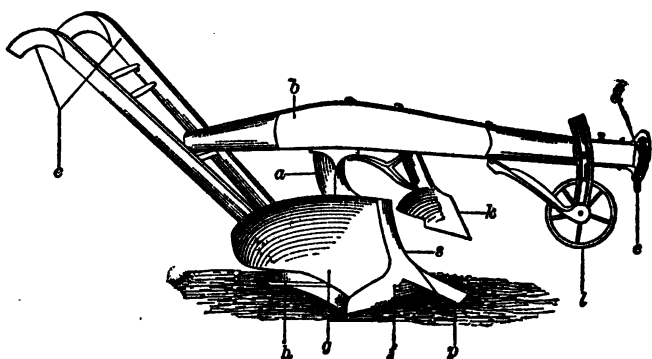
No amount of argument or explanation could banish his skepticism. For months, every time we met, I had to listen to caustic remarks about “ book farming.”

The ten-acre field in question was a waste of self-sown grass and weeds over corn stubble. About the 10th of July the crop, such as it was, was cut and cured for bedding, as we could not afford to burn it, which would have been much the better way. Late in September the ground was plowed to a depth of eighteen inches, the furrows being turned at an angle to the ground, to insure rain and frost sinking to the full depth of the newly opened subsoil. Lime was then scattered broadcast—the exact

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quantity I cannot quote, but I should think about 200 pounds to an acre.

A six-acre field across the brook was sandy—almost shaley—in character, and just as infertile; but the years of shallow plowing had



(a) Stock. (b) Beam. (c) Handle. (d) Clevis. (e) Shackle. (f) Share. (g) Mould board. (h) Landslide. (k) Jointer or Skimmer. (l) Truck or Wheel. (p) Point or Nose. (s) Shin.

been beneficial instead of detrimental, for they had established what is technically called “plow pan,” and means a layer of firmly packed soil immediately below the cultivated surface.

After a good deal of contemplation, adding

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and subtracting from information gathered from several different sources, I decided that the best course would be to plow the customary depth, when the soil was moderately wet, using a bould mold-board (the upper part of a plow, which regulates at what angle the furrow is turned), and apply a liberal dressing of lime, and, lastly, the heavy roller.

As the necessity for different tillage in the two fields may not be plain to the layman, I will try to explain. Heavy, clayey soil is really extremely fine-grained earth—good in itself, but as wanting in substance as fine pastry flour. Plowing when wet is like mixing such flour with water. It works into paste like mud, which, in drying, cracks apart into stony clods, from which the roots of plants can gather little food.

The years of shallow plowing had, of course, established a plow-pan in the clayey field, but in that case it was an impregnable obstacle to the ascent of moisture during dry weather, or the descent of rain. Consequently the few

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inches of cultivated soil had, for seasons, been alternately a mud puddle or slab—either condition fatal to growing crops. By using a subsoil plow the obstruction was removed; truly there was the danger of bringing soil long bereft of ventilation, which would almost surely be sour and poisonous, into immediate contact with root growth. But turning the furrows at an abrupt angle, and leaving the soil so exposed through the winter, allowed frost, snow and air to assist the lime in its work of purification. Moreover, the soil, being corrugated, dried much earlier in the spring.

Sandy, shaley soil is, rightly speaking, coarse earth, through which moisture escapes so rapidly that all sustaining qualities are washed away. A plow pan, under such conditions, acts like the fine sand, or lower layer, in a filter. The animalculæ and ammonia, with which all rain is charged, is retarded in passing through, and calls into active existence what plant food the soil possesses, but the moisture has free way

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to the lower depth, from where it can as easily ascend in times of drought.

Deep plowing, such as we used, on the clayey soil, would have destroyed the pan, and been as disastrous as not demolishing it in the heavy soil. Using a bould mold-board, turned the furrow almost completely over, carrying what old root growth there was on the surface down to the pan, or subsoil, where moisture aided its disintegration. The disk harrow and roller pulverized and compressed the coarse grains of earth into a less leachable condition.

As far as the texture of the soil was concerned, the two fields were diametrically opposite; but going further into the question of appropriate soil for crops proved that both were woefully deficient in humus, one of the most vital requisites.

Webster's definition of humus is "animal and vegetable mold"; which explains the worst feature of incompetent farming more correctly than dozens of learned dissertations.

Under natural conditions, plants and trees

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gather the innumerable ingredients necessary for their growth and sustenance from the soil and atmosphere, reach maturity, gradually die, and, as no change ever fails to create new conditions, the amalgamated forces, in disintegrating, produce chemical properties never yet fully classified, though experts acknowledge their unapproximated value in awakening dormant elements of the soil. In addition to returning nitrogen, phosphoric acid, potash, and lime, dying vegetation bestows the benediction of its ashes on the earth, which become the much-prized humus of agricultural vocabulary.

When man demolishes nature's herbage, to plant commercial crops which are reaped at maturity, he subverts nature's restoration, and the leavening influence of humus, except in cases where crops are principally kept for home consumption, and honestly return to the earth in the form of barn-yard residue. Frequently run-down soil is more in need of humus than of the ingredients of plant food. Clayey soil cements together from the want of its

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fibrous interference. Sandy soil cannot cohere without its aid.

Our stock was not large enough to supply, in one season, sufficient manure to repay the years of robbery. Buying it, or adopting the new system of sowing crops, to plow under as "green manure," would have been beyond the exchequer; so, as usual, a modified course had to be adopted on the first field, which was the heavy soil. Turning in the sod, poor as it was, supplied some humus.

Early in the spring, as the ground was dry, it was harrowed, sowed with Golden Vine variety of Canadian peas and oats, two bushels of peas and one of oats to every acre, mixed, and planted with a drill; rows eighteen inches apart; seed covered two inches. Cost of seed for the ten acres, \$25.

On June 20th we commenced cutting for green fodder, using a scythe, and slicing down just the quantity to feed each day. By July 7th not quite an acre had been cut. The silo was not finished, and we did not wish to keep

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the peas and oats on the field long enough to cure for hay, so accepted an offer made by a man who had recently bought the large stock farm of the neighborhood, and who had silos, but no crops. He was to cut the remaining nine acres, five inches above the ground, and pay us \$40.

This may not seem a very thrifty proceeding, but we had other soiling crops ready to use, and the peas had answered the purpose for which they had been planted—namely, to gather nitrogen from the air and transplant it to the soil. It has been estimated that a good crop of Canadian field peas supplies one ton of nitrogen per acre. Commercial nitrogen costs \$36 per ton. Therefore we did not grudge the stock gentleman his bargain, even though he did get 80 tons of green forage.

When the field was clear it was plowed to turn in the remaining vines and stubble, harrowed, and sown, on August 10th, with Henderson's Permanent Grass Mixture. The mixture cost \$2.50 a bushel, and it takes two

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bushels and a half of seed per acre. An old man assured my husband that "Rockefeller couldn't pour money on the land that-a-way and not come up against the poor-house."

Of course, grass-seed could be bought at the village feed-store for 80 cents a bushel, but what is the use of paying for weed seed? And poor grass-seed usually contains a goodly percentage. Moreover, the too fine texture of the clayey soil is accentuated by constant tillage. Therefore, having thoroughly aroused the soil to active life, the next consideration was to sow it to a permanent crop, which this mixed grass really is, lasting, they say, over twenty years. Our experience with it has only been eight years, but it yields better now than it did at first, so I quite believe in the twenty years' term.

On March 2d clover at the rate of ten pounds to the acre was added; and on June 15th of the following year we cut 39 tons of splendid hay; second cutting, on August

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19th, 17 tons. Cost of seed, 25 bushels, \$62.50. One hundred pounds of mixed clover, \$25. Market price of hay that year was \$16 a ton, so the crop can be counted as worth \$896.

The average for that field since has been \$900, and the only expense a top dressing of fertilizer which, when all bought, did not exceed \$150 a year. Timothy and clover would not have given more than two tons per acre; would not have lasted more than three years without deteriorating.

The sandy soil, which we will call field No. 2, and which we did not take under cultivation until a year later than field No. 1, was seeded, immediately after being rolled, with Excelsior Winter Rye—one bushel and a half to the acre. There were six acres in the field, so seed cost \$11.40. June 5th the crop was cut and yielded 23 tons, from which 115 bushels of grain were thrashed. The straw was kept for bedding, the grain sold, at \$1.40 a bushel, making \$161. Oh, I had nearly forgotten to say that half an acre had been cut

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early in the spring, to supply the poultry with green food.

The day after the rye was off the field it was plowed, harrowed, rolled, and seeded, on June 10th, with soy beans: rows 30 inches apart, seeds about $2\frac{1}{2}$ inches apart in the rows which consumed about three pecks of seed to the acre. The field was cultivated three times to keep down the weeds between the rows until the beans got good headway. August 1st we commenced to cut for cows and other stock; used about three-quarters of an acre. September 8th the pods were nicely filled, and the crop ready for the silo. Seed had cost \$18. We reaped 50 tons of ensilage, which ended the first year's operating.

Light plowing, harrowing, and rolling were again resorted to, and then, as the seed-bed was in fairly good condition, winter rye was sown, at the rate of five pecks per acre. Cost for the whole six acres, \$24. Early in the following spring 400 pounds of nitrate of soda was applied broadcast; cost, \$13. Result, 116

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bushels of grain, kept for poultry, value \$174; straw sold for \$89. Field, clear by June 12th, dressed with wood ashes, and planted with the main crop of potatoes. Used 12 barrels of Carmen No. 8; cost, \$54. September 6th, harvested 1,260 bushels of large, marketable potatoes, and 250 bushels of small ones. Latter kept for stock; former sold at 40 cents a bushel; cash return, \$504. End of second year.

September 16th, field harrowed and seeded with one bushel of winter vetch and half a bushel of rye. Cost for whole field, \$39. All cut for soiling during March and April. Rough estimate of crop, 15 tons per acre, 80 tons of which was given to a neighboring farmer in exchange for use of double team. April 20th, field manure applied; harrowed and planted carrots—four pounds of seed to the acre. Cost for the six acres, \$12. Result, 1,600 bushels; 1,000 bushels sold at \$200. Crop harvested July 12th; field again tilled, and sown with Japanese millet, ten pounds

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of seed to the acre, in rows 14 inches apart; cost, \$5.40. By August 30th the winter crop of 84 tons had been stored away in the silo. End of third year.

By September 15th rye and timothy was sown at a cost of \$15. March 20th, clover sown, at the rate of four pounds to the acre; cost, \$7.20. June 8th, rye was cut, yielding 110 bushels of grain and 18 tons of straw. Grain sold at \$50; straw, \$36. July 5th, hay was cut, yielding 8½ tons; value \$56. End of the fourth year.

Of course no tilling had to be done the fifth year, but the field received a dressing of nitrate of soda in the spring. June 20th, 18 tons of hay was harvested. September 2d, 4 tons. Value, \$352.

Sixth year the hay crop was one ton more. Seventh year hay fell off two tons, and the field was again put into tillage.

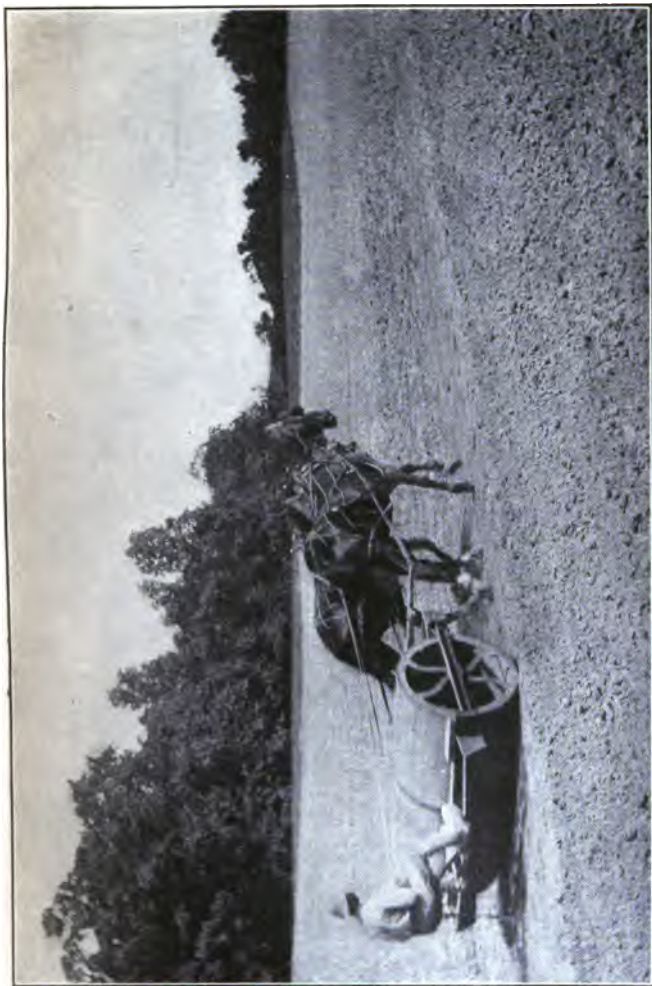
From the foregoing you will see that field No. 2 was kept under constant tillage for five years, the soil never being without a crop, win-

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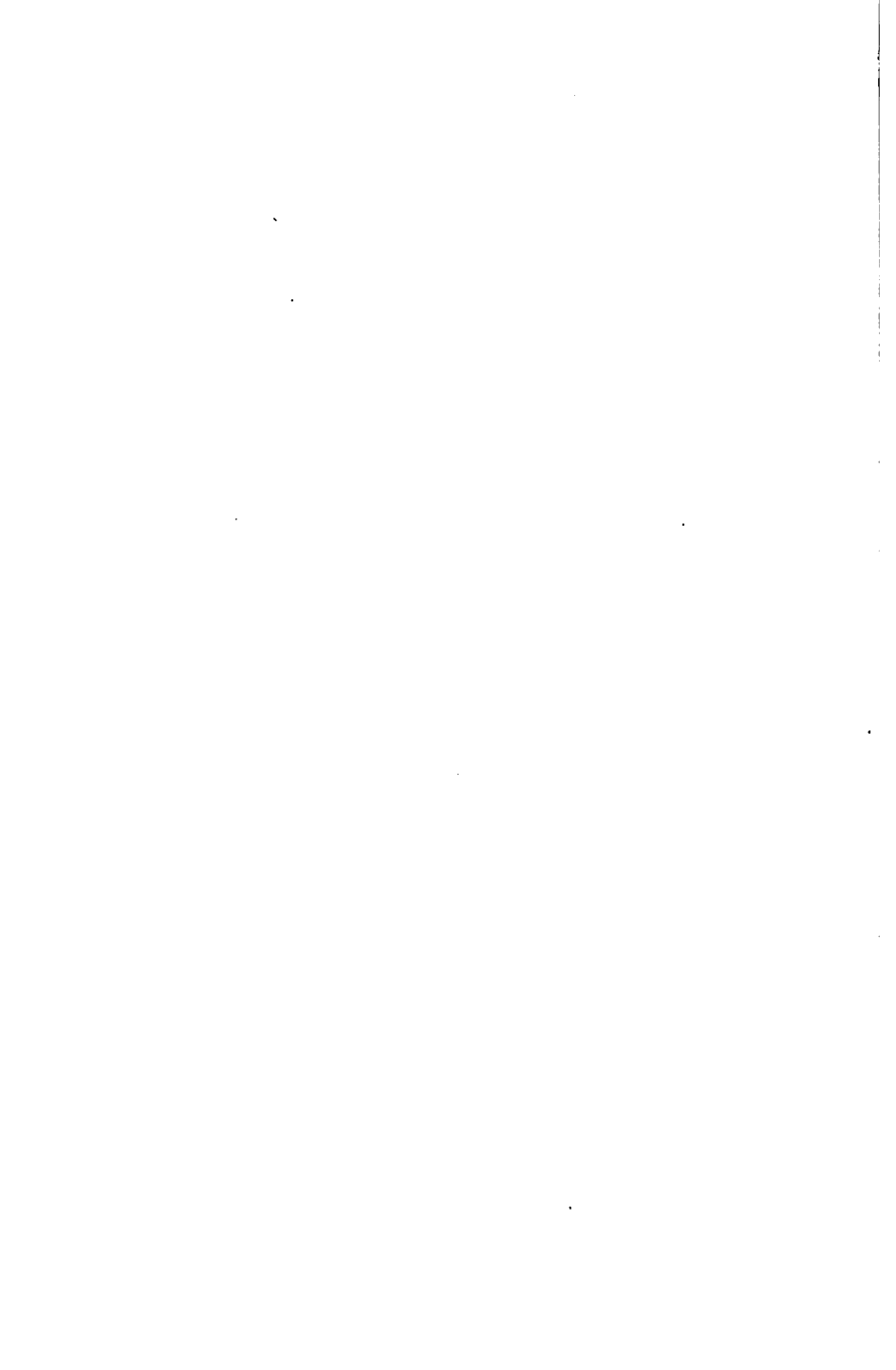
ter or summer, for seven years. Constant tillage worked the soil to a fine texture. Frequent turning in of stubble added humus. The leguminous crops had furnished nitrogen. Never being without a growing crop had prevented any leaching of the soil, and when the soil again came into tillage, it was splendidly fertile and mellow.

Old grass lands were always top-dressed in the fall, plowed, and left open, and rotation crops started the following spring, with potatoes or corn, cowpeas, Japanese millet, or rape used as catch crops. The following spring oats and clover; the next year wheat; then back to rye, timothy, and clover.

No charge for labor has been put against any of the crops, because it is a task quite beyond my capacity. The year after we had all the land another regular man was engaged at \$15 per month. Each year two extra men have been engaged for odd days, but, at the most, not over \$100 per year has been spent in extra work, so any genius in arithmetic can



THE FINISHING TOUCH



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probably discover how much the crop cost to work.

The details of work on fields 1 and 2 have been given because they were in the worst condition, and so different in character that we have always considered their restoration as our most valuable experiences in tillage, rebuilding soils, and rotation of crops. If I had to undertake the work again, the fields would be sown with rye in the fall, and timothy and clover in the spring, instead of using the timothy in the fall, and clover alone in the spring, as we did at that time. This amendment was suggested by reading of Mr. T. B. Terry's success in making the innovation on his farm.

The exact process is to sow either rye or wheat in rows in September; then in March, at the first signs of winter breaking, a still, bright morning after a heavy frost is selected for Mr. Fred or Sidney to start off with the seeder, first filling it with timothy seed, and then with clover. The work must be accom-

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plished before the sun has grown strong enough to thaw the ground. (It does not matter if there is a little snow on the ground.) Then, when the sun does come out, the seed sinks at once into the softening surface, and following frosts and thaws will cover the seed just right.

When the rye or wheat is harvested in June, however, the timothy and clover have an equal growth, and the stubble of the removed crop is quickly covered by them. If the land is good, a fair cutting of hay can be made in July. At the end of August, or 1st of September, according to the season, the field is again cut, but the herbage is left, as it falls, for mulch. Should the season be wet, a field cut in August will bear another clipping in September, but must not be done after the 15th, for the plants must have time to make some growth before frost.

This system of mulching the clover-field with its own clippings is also borrowed from Mr. Terry. The mulch protects the crop from

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frost, and adds humus to the soil. Moreover, the cropping of the growing plants strengthens and increases root growth, equalizing the surface for a uniform start the following spring.

Our choice of crops was, of course, controlled by the needs of the stock we keep. Poultry and game require corn, wheat, oats, clover, beets and onions; cows, corn, soy beans, millet, wheat bran, hay, carrots; sheep, about the same, with rape added; horses, oats, corn, carrots, hay; and for all, straw is used as bedding.

The rotation is also arranged, as nearly as possible, to assign to the different soils the most congenial crops; yet deep and shallow rooting plants should be alternated on every soil, no matter what the texture. The fine, hair-like rootlets that wander far into the earth, draw up a wealth of plant food and vitality, untouched by the shallow roots; besides, top roots add considerably to the supply of humus.

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The Bureau of Agriculture has made some extensive tests along these lines, using wire cases, sunk into the ground, which have been taken up at different stages of growth, the earth being gradually washed out, and the roots left intact for measurement.

The following summaries I clipped from different Government publications in 1888, 1892, and 1896:

CORN ROOT SYSTEM.—At the Wisconsin Station, samples of corn taken 42 days after planting, when the tops were about 18 inches high, showed that the roots of two hills met and passed each other in the center of rows $3\frac{1}{2}$ feet apart, and had penetrated the soil to a depth of about 18 inches. The surface roots sloped gently downward toward the center of the row, where they were about 8 inches below the surface. At the time of the last cultivation, when the corn was nearly 3 feet high, the roots were found to occupy the entire soil, down to a depth of about 2 feet, and the surface laterals descended in a gentle curve to-

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ward the center of the row, and passed one another at a depth of only 6 inches. A third sample taken when the corn was coming into full tassel showed that the roots had fully occupied the upper 3 feet of soil in the entire field, and that the surface laterals at this time had risen still higher, a few of them being scarcely 5 inches beneath the surface. At maturity the roots extended fully 4 feet into the soil, and the upper laterals were within 4 inches of the top of the ground.

In studying the total root distribution of corn from 9 to 27 days old, it was found that at the end of 9 days some of the roots had extended laterally to a distance of 16 inches, and that some had reached a depth of 8 inches. The tips of the longest roots were 6 inches below the surface, and no roots were nearer the surface than 3 inches, at 6 inches from the hill. Eighteen days after planting, the tips of the longest roots had spread laterally to a distance of 18 inches, and were 5 or more inches below the surface, while the longest roots extending

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downward had scarcely reached 12 inches, and 6 inches from the hill no roots were nearer the surface than 2 inches. Twenty-seven days after planting, the greatest depth reached by the roots was 18 inches, and the greatest lateral extension 24 inches from the hill, with the tips 4 inches below the surface. The depth of the roots at 6 inches from the hill was the same as 9 days before.

In similar work along this line the North Dakota Station found that 30 days from planting, the main roots appeared to have developed laterally and but few had penetrated to a depth of 12 inches, the bulk of the roots lying within 8 inches of the surface of the soil. An examination 55 days from planting, when the plants were 54 inches high, showed that the primary roots had penetrated to a depth of $2\frac{1}{2}$ feet, and that many of the horizontal roots now extended from hill to hill. The lateral roots frequently sent up feeders within 2 inches of the surface. A third sample was taken 90 days from planting, and soon

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after the corn had been killed by frost. The roots at this time seemed to be still alive and growing. At this stage the roots had penetrated the ground to a depth of $3\frac{1}{2}$ feet, and they fully occupied the soil of the entire field.

The Kansas Station found that the roots of corn are more extensive than those of Kaffir corn and sorghum. Kaffir corn showed a thick growth of surface roots, while the root system of sorghum had a greater resemblance to that of corn. The roots of listed corn had developed to a uniform depth, and the surface roots were uniformly deeper in the soil than in level-planted corn. It was also shown in these experiments that the roots of corn and other cultivated crops spread out farther, but did not grow so deep into the soil as the roots of wheat, oats, and barley.

All these experiments indicate that, by cultivating deeply, the large, lateral roots of corn lying at a depth of 4 inches midway between the rows are likely to be broken. It is believed that as roots of listed corn lie deeper, corn

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planted by this method may be cultivated close to the hill and 3 to 4 inches deep at the last cultivation without injury to the roots, while in level-planted corn the roots rising nearly to the surface several inches from the hill are destroyed by close cultivation. Deep cultivation for the purpose of forming a thick soil mulch is considered necessary, however, for the last cultivation of corn in hot and dry climates.

SMALL GRAINS.—Wheat roots examined 110 days after sowing the seed were found to extend directly downward, sending out numerous small feeders which practically occupied the soil to a depth of about 4 feet. In later experiments the roots of durum (a variety of wheat adapted to somewhat alkaline soils and hot, dry climate) and bread-wheat reached a depth of more than 4 feet, and again showed that the system of rooting is vertical instead of lateral, as in corn. The root development was greater in the durum than in the bread-wheat samples. It was also observed that the root development in cereals



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varied considerably during different years. The root system of oats was found to be similar to that of wheat, but the roots were longer and more numerous, and extended fully as deep into the ground. The roots of emmer (another variety of wheat often mis-called spelt wheat in this country, where it is used for stock food only, thrives best in hot climates) resembled those of wheat and extended to about the same depth. A sample of winter rye, taken July 7th, showed that the roots had reached a depth of only 3 feet, and their development was smaller than in other samples of cereals generally. It is believed that early in the season the soil in the latitude of the station is too cold below a depth of 3 feet to admit of root growth. At the Kansas Station oats and barley produced a large fibrous growth of roots in the surface soil, but this was not equal to the growth of fibrous roots in the upper soil made by some perennial grasses.

ROOT SYSTEM OF GRASSES.—The North

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Dakota Station also examined the roots of one- and two-year-old plants of *Bromus inermis*, and found that at one year old the roots had attained a depth of over 4 feet and formed a good sod, while the roots of the two-year-old grass had reached a depth of at least 5½ feet. In comparing the root systems of native prairie grasses, timothy roots, and the roots of *Bromus inermis*, it was found that the roots of the native prairie grasses did not make as heavy a sod as the cultivated ones, and that the roots examined reached less than 3 feet in depth. In later work a brome grass specimen taken from a three-year-old sod showed the densest rooting of all samples of cereal and forage crops. Native slender wheat grass, also from a three-year-old sod, did not have the strong root growth of the brome grass, although its root system was heavier than that of any other crop studied. The Kansas Station also found that the largest growth of fibrous roots in the surface soil was made by the perennial grasses as compared

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with cereal and other crops, and that certain species also extended their roots deeper into the soil than any other class of crops except perennial leguminous plants.

ROOT SYSTEMS OF LEGUMES.—At the Kansas Station alfalfa was the deepest-rooted crop studied. The plant developed only a small growth of fibrous roots near the surface, the principal root development being deeper in the soil. Cowpeas and soy beans appeared to be light-rooting crops. At the North Dakota Station the roots of red clover during two years of development grew down over 4 feet, and quite fully occupied the upper 3 feet of soil. Crimson clover roots in a single season attained a depth of 3 feet by August 22d.

POTATO ROOT SYSTEM.—Samples of an early and late variety of potatoes showed that the main portion of the root growth of this plant is shallow. Forty-three days after planting, the principal part of the root development was found to lie within 8 inches of the surface of the ground. The lateral roots

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had extended from hill to hill and interlaced. Some of the principal lateral roots were found to be only $2\frac{1}{2}$ inches from the surface at 6 inches from the hill. This root development indicates the necessity of shallow cultivation of the crop, and this was confirmed in experiments with deep and shallow cultivation, the results showing a decided advantage for the shallow cultivation of potatoes unhilled. It was also shown that late potatoes root more freely and more deeply than early ones, and as a result will not stand as close planting as the early varieties. When the hills are about 3 feet apart each way, the soil is very fully occupied by the roots to a depth of 3 feet.

SUGAR-BEET ROOT SYSTEM.—Sugar-beet plants examined by the North Dakota Station at maturity, or 133 days after planting the seed, presented a deep root extending almost perpendicularly downward into the ground, the lower part being quite small and thread-like and reaching to a depth of more than 3 feet, and the lateral roots starting 4 or 5 inches

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from the surface with but little root development in the upper 6 inches of the soil. The greatest amount of branching and fibrous growth of beet roots took place in the space between 8 and 14 inches in depth. The effect of subsoiling on the root growth and development of sugar-beets, as studied by this station, resulted in a considerably better development of feeding roots and a more symmetrical development of the main root on the subsoiled plats. The Kansas Station also found that the root system of the sugar-beet lies comparatively deep, and that the crop therefore admits of deep cultivation.

This study of the roots of plants gives us a clearer idea of the proper methods of preparing and cultivating the soil for the different field crops. In general, root systems of crops like corn, potatoes, beets, beans, etc., reach from row to row and near the surface, and hence should be given shallow cultivation, though beets may be cultivated deeper than the other crops mentioned.

CHAPTER FOUR

BUILDING AND OPERATING A SILO

IN the days when poultry was the main consideration, before we had even one cow, dandelions, plantains, and such green things were gathered and packed tightly in barrels, to keep them for the ducks in winter. Later, two well-tiles were cemented together, and used for the same purpose. Then the railroad company moved their water station from the cut in the wood to the depot. We bought the old water tank, moved it up near the feed-house, and were quite proud of our poultry "silo" for a year or so, until we became convinced that attempting to maintain the increased herd of cattle and sheep without silage was penny-wise and pound-foolish, especially as prosperity fully warranted the outlay.

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The silos on the stoek farm were immense, elaborate affairs of brick, and plastered interiors, which were always needing repairs, so that style was tabooed. We decided that the foundations should be concrete, for, since the early days when I essayed the craft of masonry, and succeeded in making our first cow's stable a tidy, wholesome place, concrete has been used whenever possible about the farm, and our equipment of tools and knowledge had grown sufficiently to make Mr. Fred and Sidney quite capable of attending to that part of the work unaided; but the cylinder storehouse itself gave us much anxious thought, until we decided to engage a couple of practical carpenters, as accuracy in the construction of a silo is most imperative, and adopted for a model the one in use at the Cornell Experiment Station.

A circular trench, two feet wide, with an outer diameter of twenty-two feet, was dug about three feet deep, in which to start the concrete wall. When it was six inches above

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the ground, the surface soil inside the circle, and for two feet all round the outside, was removed to a depth of ten inches, to permit a layer of coarse stone to be laid as sub-foundation for the mixture of Portland cement and gravel, a two-inch layer of which formed the foundation for the finishing application of Portland cement and fine gravel, that gives the smooth, stone-like surface to concrete work.

The permanent posts for the cylinder were 6×6 material (a a a a, Fig. 1), 30 feet long, and were erected at equal distances, held securely in place by a scaffolding, which was erected as shown in the sketch of ground plan, which I am allowed to reproduce by courtesy of the Agricultural Department. The posts (b b b b, Fig. 1) are of 2×4 scantling. The boards nailed from the corner posts, and to the 6×6 material, form a rigid framework, across which the planks (c c c c, Fig. 1) for the scaffold platform are laid.

Before going further, the staves were

THE EARTH'S BOUNTY

stored in the circle, in accordance with a hint given in the directions, and which the men fully appreciated after they had experienced

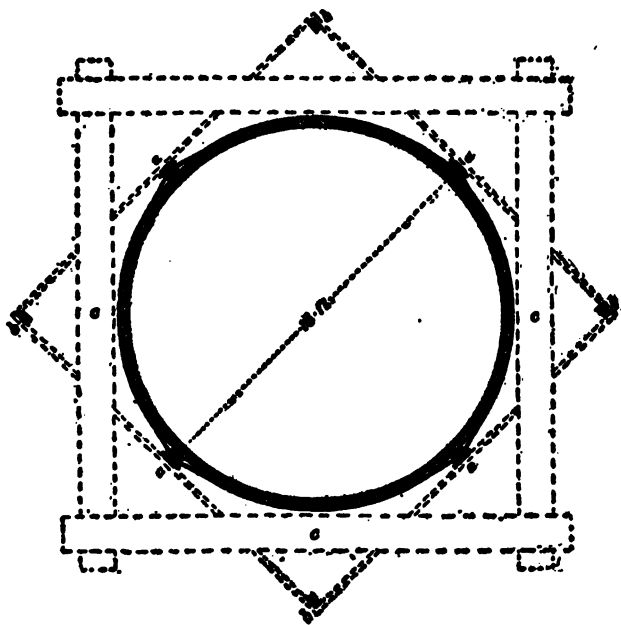


FIG. 1. GROUND PLAN OF STONE. SILO ABOVE FOUNDATION.

the difficulty of getting a few extra ones in place when the silo was nearly completed. The staves we used were 2×6 , tongued and

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grooved, slightly beveled, 20 feet long, and surfaced on one side, to insure the smooth interior necessary to permit silage to settle. In setting up, the ends which met at the splice were squared and toe-nailed securely together. First a long stave and then a short one was at the bottom, making the breaks come alternately 20 and 10 feet above the foundation.

The hoops were made of round steel rods, which were in four sections, so that the ends could be passed through the permanent 6×6 posts, and securely fastened with nuts. The first hoop was placed 6 inches above the foundation, the second 1 foot higher, the third $2\frac{1}{2}$ feet higher, which distance was maintained up to the top. The hoops, or rods, were only tightened enough to keep the staves closely together at first; made a little snugger when the building was completed, but not taut until the silo was filled.

Doors were made in every other section between the hoops, 2 feet wide and $2\frac{1}{2}$ feet high. When the staves were being set in place, a

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slight cut was made to indicate where the top and bottom of the door would come, so that, after the silo was built, a saw could be inserted, and the door portion sawed out on a bevel, to make the opening larger on the inside of the silo; so, when closed, the pressure of the silage effectively keeps it in place.

Previous to cutting out the doors, cleats, 2×3 inches, 2 feet long, cut in circular form, to conform to the shape of the silo, must be bolted across top and bottom of the portions to be moved.

The location chosen for our silo was the space between the main barn and the cow barn, which was 24 feet; so, instead of putting an individual roof to the silo, we built a roof over the entire space, so forming a covered shed, which answered the double purpose of protecting the silo and the men. Silage has to be taken out twice a day during the worst half of the year, and it is not conducive to men's health or temper to be exposed to driving storms while doing such work. The

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roof was peaked above the center of the silo, the front slope being only 15 feet, and having a trap-door for use at filling time. The

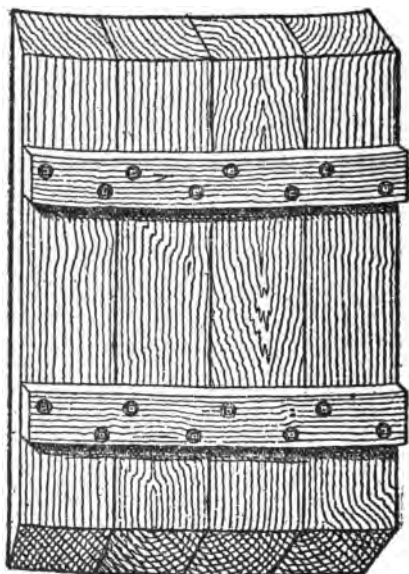


FIG. 2. DOOR AFTER BEING SAWED OUT.

back slope extended to the rear of the barn. Double doors, which could be thrown quite back in fair weather, or closed for storms, completed the shed.

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A door was cut into each barn wide enough to admit a truck 2 feet wide and 4 feet long, which was made of wood, furnished with four small wheels, and arranged on a pulley and chain, to swing up to the silo doors, where it would be filled, lowered, unhooked, and rolled into either barn, so lightening the work.

When finished, the entire cost of silo and roof was \$154, a sum which can be reduced considerably if only an individual roof is used, which can be made in the conical form with little difficulty, if the silo is not more than 15 feet in diameter; for no rafters need be used, and only a single circle, like the one in the center of the sketch, which is made of 2-inch stuff cut in sections, in the form of a circle, and two layers spiked together, breaking joints.

The roof boards are put on by nailing them to the inner circle and to the plate, as shown in the drawing, the boards having been sawed diagonally, as represented at H, Fig. 4, making the wide and narrow ends the same rela-

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tive widths as the circumferences of the outer edge of the roof and of the inner circle.

If the silo has an inside diameter exceeding

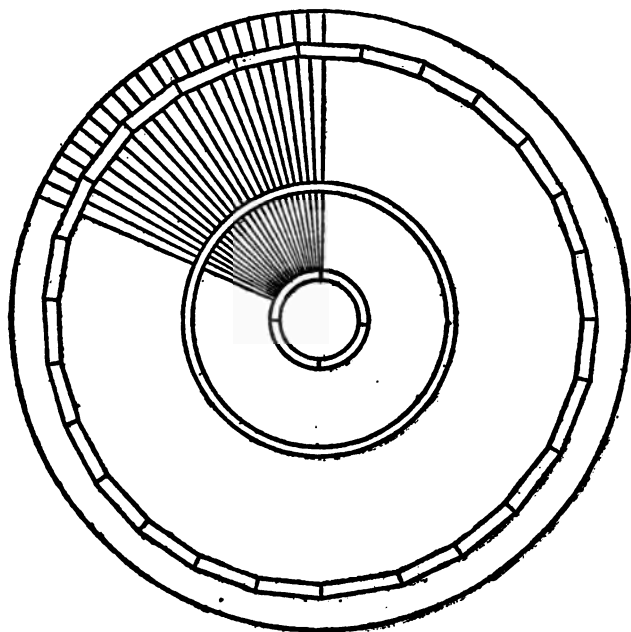


FIG. 3. CONICAL ROOF.

15 feet, it will be necessary to use two or three hoops, according to diameter. When the diameter is greater than 25 feet, it will usu-

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ally be best to use rafters and headers cut in for circles 4 feet apart to nail the roof boards to, which are cut as represented at H, Fig. 4.

The conical roof may be covered with ordinary shingles, splitting those wider than 8 inches. By laying the butts of the shingles $\frac{1}{8}$ to $\frac{1}{4}$ of an inch apart, it is not necessary to taper any of the shingles, except a few courses near the peak of the roof.

In laying the shingles to a true circle, and with the right exposure to the weather, a good method is to use a strip of wood as a radius which works on a center set at the peak of the roof, and provided with a nail or pencil to make a mark on the shingle, where the butts of the next course are to come. The radius may be

bored with a series of holes the right distance apart to slip over the center pivot, or the nail may be drawn and reset as desired. Some car-

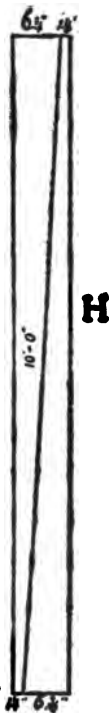


FIG. 4.

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penters file a notch in the shingling hatchet, and use this to bring the shingle to place.

Though the first large silo has proved perfectly satisfactory in the sheltered position it occupies on our farm, I would not advise building one of the same size and structure in an exposed position. The one we put up two years later, especially for young and market stock, near the outlying barn, was a much heavier edifice, on what is called the Wisconsin model—foundation almost the same in every detail as that used for the first building, but the cylinder was double, interlined with building paper, and cost almost double. However, circumstances will, of course, guide individual selection, but some general points must be observed, such as appropriate location, convenience to the barn, well-drained foundation. It is safer, under all conditions, to have brick or concrete, as clay soils will rarely be able to absorb the moisture, and sandy soil permits the gases of the earth to ascend into the silo.

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When the more elaborate building, like the Wisconsin, or brick-lined silo, is selected, it is imperative to provide ample ventilation for the spaces between the studs, as well as for the roof and the inside of the silo. Between each pair of studs, where needed, a 1¼-inch auger hole, to admit air, is bored through the siding and sheeting, and covered with a piece of wire netting, to keep out mice and rats. At the top of the silo on the inside, the lining is only covered to within two inches of the plate, and this space is covered with wire netting, to prevent silage from being thrown out when filling. This arrangement permits dry air from outside to enter at the bottom between each pair of studs, and to pass up and into the silo, thus keeping the lining and studding dry, and at the same time drying the under side of the roof and the inside of the lining as fast as exposed. In those cases where the sill is made of 2 × 4's, cut in 2-foot lengths, there will be space enough left between the curved edge of the siding and sheeting and the sill for air to

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enter, so that no holes need be bored, as described above. The openings at the plate should always be provided, and the silo should have some sort of ventilator in the roof. This ventilator may take the form of a cupola, to serve for an ornament as well, or it may be a simple, galvanized iron pipe, 12 to 24 inches in diameter, rising a foot or two through the peak of the roof.

The size of the silo will have to be determined by the number of cattle to be fed. Two inches of the entire exposed surface must be used each day, after the silo is once opened, or there will be loss from spoiling. The accepted estimate for feed is 40 pounds per day for each cow. Calculating that silage will be required for 200 days in the year, the amount to be stored for each member of the family will be four tons, so the size of the silo should be figured out on these lines. Twelve cows will consume 48 tons of silage; the inside diameter of the silo for such a herd should be 12 feet, 24 feet high, as then the necessary

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240 pounds of silage per day will remove a 2-inch layer.

The number of staves required for different sized silos can be ascertained from the following table:

CIRCUMFERENCES AND AREAS OF CIRCLES

Diamet'r. Feet.	Circum- ference. Feet.	Area. Square Feet.	Diamet'r. Feet.	Circum- ference. Feet.	Area. Square Feet.
8	25.1	50.3	21	66.0	346.4
9	28.3	63.6	22	69.1	380.1
10	31.4	78.5	23	72.3	415.5
11	34.6	95.0	24	65.4	452.4
12	37.7	113.1	25	78.5	490.9
13	40.8	132.7	26	81.7	530.9
14	44.0	153.9	27	84.8	572.6
15	47.1	179.7	29	88.0	615.8
16	50.3	201.1	30	91.1	660.5
17	53.4	227.0	31	94.2	706.9
18	56.5	254.5	32	97.4	754.8
19	59.7	283.5	--	100.5	804.2
20	62.8	314.2			

To find the circumference of a circle, multiply the diameter by 3.1416.

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To find the area of a circle, multiply the square of the diameter by 0.7854.

To find the cubical contents of a cylinder, multiply the area of the base (floor) by the height.

Example.—A silo 16 feet in diameter and 26 feet high is wanted; how many staves, 2×6 feet, will be needed, and what will be the feeding area in the silo and its capacity?

The circumference of a circle 16 feet in diameter is 50.3 feet; there will therefore be required $50.3 \div \frac{1}{2} = 101$ staves, 2×6 inches, 26 feet high, or if staves of this height cannot be obtained, 135 staves 20 feet long, or 50 each of 12 and 14 feet long staves. The feeding area will be $16 \times 16 \times 0.7854 = 201.1$ square feet, and the cubical content of the silo, $201.1 \times 26 = 5,228.6$ cubic feet. Estimating the weight of a cubic foot of corn silage at 40 pounds, 5,228.6 cubic feet of silage would weigh 209,164 pounds, or about 100 tons, which is the approximate capacity of a round silo of the dimensions given.

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ESTIMATE OF MATERIALS FOR WISCONSIN IMPROVED SILOS

Size—30 feet deep, 14 feet diameter. Capacity, 60 tons.

Brick—3,375 for foundation, 1 foot thick, 3 feet deep.

Studs—50 pieces 2×4 , 16 feet long.

Studs—50 pieces 2×4 , 14 feet long.

Flooring for doors—32 feet, 4 matched.

Sheeting—3,000 feet, $\frac{1}{2}$ inch, resawed from 2×6 16-foot plank sawed three times, dressed one side to uniform thickness for inside lining of two layers.

Lining—1,500 feet of same for outside.

Tar building paper—200 yards, water and acid-proof.

Nails—200 lbs. 8-penny; 200 lbs. 10-penny.

Spikes—20 lbs.

Rafters—22, 2×4 , 10 feet long, for usual ridge roof.

Sheeting for roof—250 feet of 16-foot boards.

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Shingles—3,000.

Shingle nails—12 lbs.

Dormer window for filling through. Paint—7 gallons providing two coats.

Cement—2 barrels, for cementing bottom.

The silo well located and built, the question of filling and managing is to be considered. The most appropriate crops are corn, millet, Canada or cowpeas, and clover. Corn is pre-eminently the fodder crop of America, but within the last few years dairymen have learned the value of soy beans, millet, and other crops, both as milk producers, fatteners, and renovators of the soil, and are gradually giving them their right place in crop rotation and rations.

As corn is the oldest favorite, it shall have precedence. For the silo it should be planted in the usual way as soon as danger of frost is over, which in the vicinity of New York is about the 10th of May; or, as a universal guide, say when apple trees are in full bloom. Drop four or five kernels every $2\frac{1}{2}$ feet, in

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rows 3 feet apart. Adopt shallow cultivation between the rows, to keep down weeds, until growth of foliage makes it impracticable.

Harvesting corn for the silo was one of the worst mistakes of my farm management. I had been assured that really green corn was the most succulent, and therefore the most appropriate. Accordingly, the first years, the silage was lacking in feed value, for it has been proven that corn does not possess all its feed values until immediately prior to ripening. "Modern Silo Methods" gives Professor Ladd's analysis of corn at five different stages of growth, from full tasseling to maturity (see table on p. 100).

Which conclusively shows that ripe corn contains the greatest supply of food value; but careful trial of digestive qualities proved that the period immediately before ripening, when the kernels are just becoming firm and slightly glossy in appearance, is the most economic time to cut for the silo, especially as immature corn causes it to deteriorate in the

THE EARTH'S BOUNTY

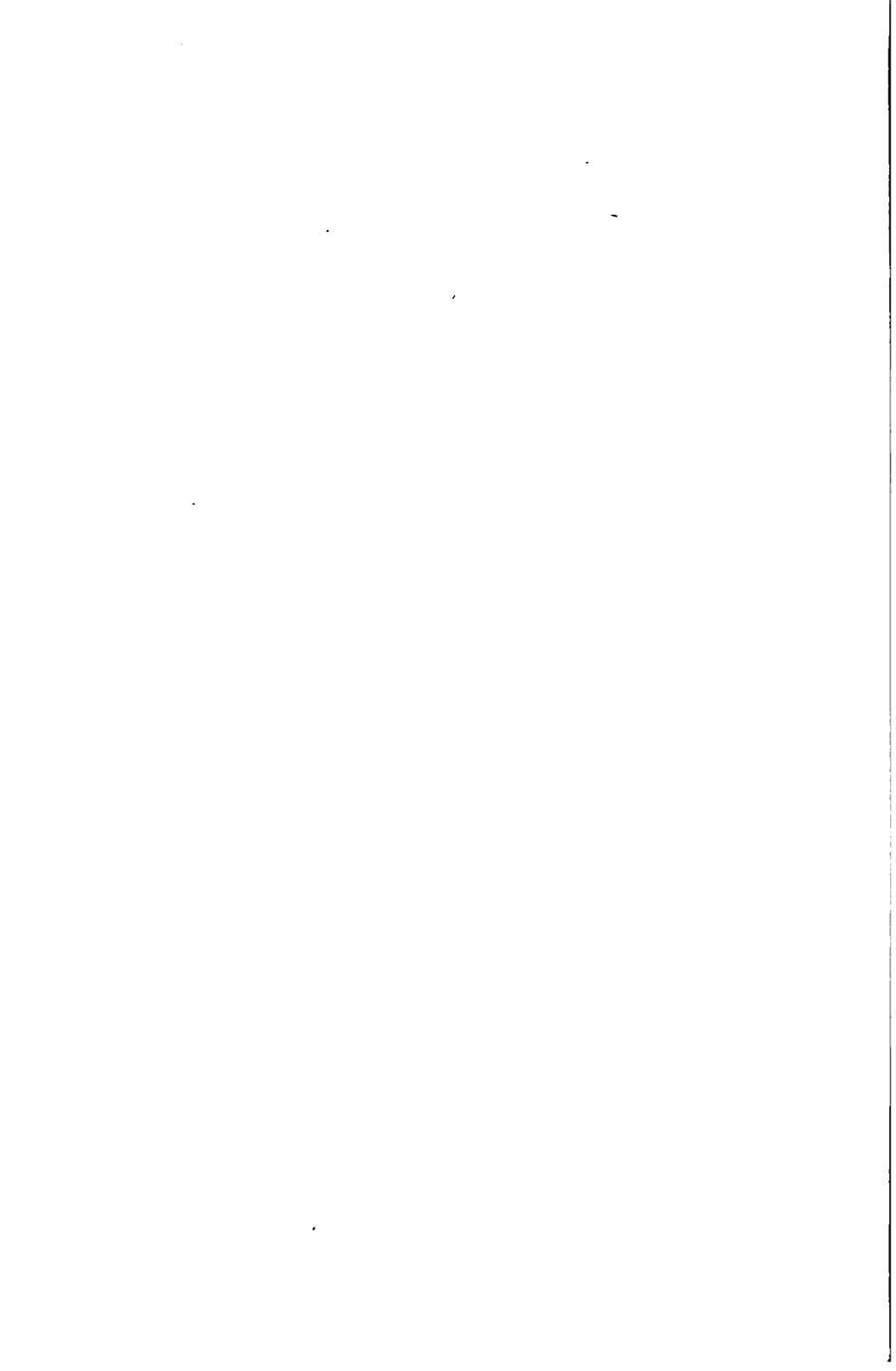
Yield per Acre.	Tass'l'd. July 30. Pounds.	Silked. Aug. 9. Pounds.	Milk. Aug. 21. Pounds.	Glazed. Sept. 7. Pounds.	Ripe. Sept. 23. Pounds.
Gross Weight . . .	18,045	25,745	32,600	32,295	28,460
Water in the Crop	16,426	22,666	27,957	25,093	20,542
Dry Matter	1,619	3,078	4,643	7,202	7,918
Ash	138.9	201.3	232.2	302.5	364.2
Crude Protein . . .	239.8	436.8	478.7	643.9	677.8
Crude Fiber	514.2	872.9	1,262.9	2,755.9	1,734.0
Nitrogen-free Ex- tract (starch, sugar, etc.)	653.9	1,399.3	2,441.3	3,239.8	4,827.6
Crude Fat					
	72.2	167.8	228.9	260.0	314.3

silo much more quickly than mature corn, at which time most of the sugar is changed to starch. Nor must cutting be delayed until the corn commences to dry, for at that stage it will mould when packed in the silo.

Soy beans and Canada field peas must be harvested for the silo when the pods are well formed and the seeds three-quarters grown. Probably these two most desirable crops have been neglected by farmers in general because the tangled vines could not be cut with the or-



FILLING THE SILO



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dinary hay-mower, and reaping with the sickle is such a tedious labor. But now there is a special cutter made in Canada, with guards in front to lift the vines out of the way and allow the knives to cut cleanly. It can be attached to any ordinary field mower. Ours was bought at a sale for \$8, so I do not know the original price, but it can't be very much.

Millet should be cut as the heads appear. Clover, when in full bloom, but before the heads commence to die down. Green clover may be siloed whole or cut, but the latter method is to be recommended. The clover should not be left to wilt between cutting and siloing, and the silo should be filled rapidly, so as not to cause unnecessary losses by fermentation.

The different species of clover will prove satisfactory silo crops; ordinary red or medium clover is most used in Northwestern States, along with mammoth clover; the latter matures later than medium or red clover, and may therefore be siloed later than these.

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CLOVER FOR SUMMER SILAGE

By filling clover into the silo at midsummer or before, space is utilized that would otherwise be empty; the silage will, furthermore, be available for feeding in the latter part of the summer and during the fall, when the pastures are apt to run short. This makes it possible to keep a larger number of stock on the farm than can be the case if pastures alone are to be relied upon, and thus greatly facilitates intensive farming. Now that stave silos of any size may be easily and cheaply put up, it will be found very convenient, at least on dairy farms, to keep a small separate silo for making clover silage that may be fed out during the summer, or at any time simultaneously with the feeding of corn silage. This extra silo may also be used for the siloing of odd lots of forage that may happen to be available. It is a good plan, in siloing clover or other light crops in rather small silos, to put a layer of corn on top that will weight down

THE EARTH'S BOUNTY

the mass below, and secure a more thorough packing, and thereby also a better quality of silage.

Professor Cottrell, writing for Kansas farmers, says: "Silage will keep as long as the silo is not opened and has been kept in good condition for seven years. This is a special advantage to Kansas dairymen, as in years of heavy crops the surplus can be stored in silos for years of drought, making all years good crop years for silo dairymen."

Many people use corn exclusively for the silo; others, what is called the Robertson Mixture—named after Professor Robertson of Canada—which is corn, horse beans, and sunflower heads, or the Getty Mixture, which necessitates growing corn and cowpeas in alternate rows and harvesting together. Neither of the latter methods seems practicable in the vicinity of New York, as horse beans are difficult to establish, and the cowpeas only suitable for a catch crop, to be used as cut from the field. Again, for the last mixture, the corn

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has to be cut before it reaches maturity. We have used corn alone, and a mixture. All things considered, I prefer the mixture, for two reasons: First, the crops like peas, beans, and clover, which are rich in protein, take the place of grain, so materially reducing expenses. Secondly, they belong to the family of legumes, which, while growing, furnish valuable fertilizer to the soil, and so are indispensable in crop rotation.

For the first two years we hired the means to fill the silo from the stock farm; then, that most unfortunate establishment being again under the hammer, we bought the whole outfit, which consisted of an Ohio ensilage cutter, with a bucket elevator, which would have cost \$250 new, for \$65. At the same time we got a portable saw outfit, the engine for which gave us 8 horse-power, capable of being used for a multitude of purposes. We gave \$100 for it, and it seems impossible that we ever managed to accomplish anything without it. If we had had to buy a new cutter and eleva-

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tor, a smaller one would have answered; but the larger the machine, the quicker the work can be done.

The traveling feed-table attached to the cutter takes a bundle of corn full-length, runs it into the knives, from whence it is carried up the elevator shaft by means of what are called the "buckets." The elevator must be several feet longer than the silo is high, so that it can be placed far enough away to reach the top of the silo at an angle. For instance, our silo is 30 feet high, and the carrier, or elevator, is 48 feet long, and it seems about right, though the makers say that carriers need not be more than 4 per cent. longer than the silo is high.

When the crops are ready, the cutter and carrier are set up ready for use, and all hands devote themselves to harvesting and filling. Half an acre of corn is cut, then half an acre of millet, next half an acre of soy beans, peas, or clover—whatever is ready—and the rotation is started over again.

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Three carts are used, a load of each being brought in at the same time. Then a small bundle of each is placed on the feed-table, sent through the cutter, caught by the "buckets," and carried by the elevator into the top of the silo. A man is stationed inside with a pitchfork, to regulate the distribution of fodder as it falls. This is especially necessary as we silo corn without removing the ears, preferring to save the grain from a more fully ripened crop.

When quite full, the fodder is allowed to settle for twenty-four hours, during which time it sinks considerably. Then it is again filled up with freshly cut material, another twenty-four hours is allowed to elapse and any deficiency made up. After which about four barrels of water are pumped up through a hose into the top of the silo, to moisten the surface, for by so doing the top layer of the silage becomes a sort of slimy seal, which protects the remainder of the material.

Probably we should not have bought the hose especially for this purpose, but having

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the engine power to operate a force-pump, we thought a hose would be a safeguard against fire.

With a single stave silo, like our first large one, the hoops should be watched very closely for a few days after the silo is filled. If the strain becomes quite intense, the nuts should be slightly loosened. If, during the summer, when the silo is empty and the staves thoroughly dry, the hoops are tightened so that the staves are drawn closely together when the silo is filled, and the wood absorbs moisture and begins to swell, the hoops must be eased somewhat to allow for the expansion.

Freezing of silage is sometimes a source of trouble. The single silo can be enclosed by a wide jacket of rough boards nailed to four uprights, leaving the section of the silo where the doors are easy of access. The space between the silo and outside jacket is filled with straw in the fall. This may be taken out and used for bedding in the spring, thus allowing the staves to be thoroughly dried out during

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the summer and preventing the silo from rotting.

In the double or lined silos freezing may be avoided by checking the ventilation, and by keeping the door in use carefully closed in severe weather. If the top layer of silage freezes, some of the warm silage may be mixed with the frozen silage an hour or two before feeding time, and all the silage will then be found in good condition when fed out. A layer of straw may be kept as a cover over the silage. This will prevent it from freezing, and is easily cleared off when silage is to be taken out.

If frozen silage is not fed out directly after thawed it will spoil, and soon become unfit to be used for cattle food. Thawed silage will spoil much sooner than ordinary silage that has not been frozen and thawed out. There is no evidence that silage which has been frozen and slowly thawed out, is less palatable or nutritious than silage of the same kind which has been kept free from frost.

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Many devices for covering the siloed fodder have been recommended and tried, with varying success. The original method was to put boards on top of the fodder, and to weight them heavily by means of a foot layer of dirt or sand or with stone. The weighting having later on been done away with, lighter material, as straw, hay, sawdust, etc., was substituted for the stone or sand. Building paper was often placed over the fodder, and boards on top of the paper. There is no special advantage derived from the use of building paper, and it is now never used. Many farmers run some corn stalks or green husked fodder through the cutter after the fodder is all in. In the South cotton-seed hulls are easily obtained, and form a most efficient and cheap cover.

None of these materials, or any other recommended for the purpose, can perfectly preserve the uppermost layer of silage, some four or six inches of the top layer being usually spoilt. Occasionally this spoilt silage may not

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be so bad but that cattle or hogs will eat it up nearly clean, but it is at best very poor food, and should not be used by any farmer who cares for the quality of his products. The wet or green materials are better for cover than dry substances, since they prevent evaporation of water from the top layer. When this is dry, air will be admitted to the fodder below, thus making it possible for putrefactive bacteria and molds to continue the destructive work begun by the fermentation bacteria, and causing more of the silage to spoil.

There is only one way in which all of the silage can be preserved intact, viz., by beginning to feed the silage within a few days after the silo has been filled. This method is now practised by many farmers, especially dairy-men, who, in this manner, supplement scant fall pastures.

By beginning to feed at once from the silo, the siloing system is brought to perfection, provided the silo structure is air-tight, and constructed so as to admit of no unnecessary

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losses of nutrients. Under these conditions there is a very considerable saving of food materials over the silage made in poorly constructed silos or over field-cured shocked fodder corn.

CHAPTER FIVE

THE BARN-YARD WEALTH

BARN-YARD manure is the farm's most valuable asset, for without it the fertility of the land cannot be maintained. Deteriorating soils curtail crops, and eventually wreck the whole scheme of supply and demand, so essential to prosperous husbandry. Yet this fundamental factor of success is ruthlessly dissipated by carelessness, and then hundreds of dollars are spent annually to supply substitutes, in the form of commercial fertilizers, which are inferior in every respect, except cost. They will, of course, stimulate growth, and are serviceable if used in moderation, and under certain conditions; but they do not improve the texture and drainage of the soil, and barn-yard manure does.

Strange to say, even farmers are extremely hazy about the relative values of solid and

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liquid excrements from different kinds of animals, or how the animal's age, food, and material used for its bedding affect them; yet such knowledge is important, for it can be of much value in selecting food, litter, and regulating the order of placing the different clearings on the manure pile, so as to obtain the best ultimate results.

Sheep and horse droppings are classed as hot manure, ferment rapidly, and quickly generate high heat. Pig and cattle manure are more watery; hence decompose slowly, and develop little heat. The relative values, per ton, of manure from different animals, is given by analysis, as follows:

COMPOSITION OF SOLID AND LIQUID EXCREMENT OF FARM ANIMALS.

	Water.		Nitrogen.		Phosphoric Acid.		Alkalies (potash and soda).	
	Solid. Per C't.	Liquid. Per C't.	Solid. Per C't.	Liquid. Per C't.	Solid. Per C't.	Liquid. Per C't.	Solid. Per C't.	Liquid. Per C't.
Horses...	76	89.0	0.50	1.20	0.35	Trace.	0.80	1.5
Cows...	84	92.0	0.30	0.80	0.25	Trace.	0.10	1.4
Swine...	80	97.5	0.60	0.30	0.45	0.125	0.50	0.2
Sheep...	58	86.5	0.75	1.40	0.60	0.050	0.80	2.0

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Commercial nitrogen is valued at 15 cents, phosphoric acid at 6 cents, and potash at 4½ cents per pound; and it has been estimated that the amount and value of manure produced per 1,000 pounds of live weight of different animals is:

	Amount per day. Pounds.	Value per day. Cents.	Value per year.
Sheep.....	34.1	7.2	\$26.09
Calves	67.8	6.2	24.09
Pigs	83.6	16.7	60.88
Cows	74.1	8.0	29.27
Horses	48.8	7.6	27.74

These estimates are based on droppings from animals of all ages. The fertilizing value would be much greater if manure from full-grown animals, in normal condition, had been considered, for they do not require any of the nitrogen, phosphoric acid, or potash; therefore, nearly all these ingredients present in the material fed pass through the body without deduction. On the other hand, growing animals and milch cows retain from 25 to

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50 per cent., to aid the production of muscle, sinew, horn, and milk. Fattening and working animals retain from 5 to 10 per cent.

Under all circumstances, and with all kinds of animals, the material fed bears directly on the manure. Agricultural experts have worked out the fertilizing value contained in some of the more general feeding materials, as follows:

	Value of nitrogen in 1 ton.	Value of phosphor- ic acid in 1 ton.	Value of potash in 1 ton.	Total fertilizing value per ton.
Corn meal.....	\$4.53	\$0.83	\$0.31	\$5.68
Corn silage.....	0.78	0.14	0.32	1.24
Crimson clover (green)	1.29	0.16	0.44	1.89
Crimson clover hay...	6.63	0.82	2.26	9.71
Red clover hay	5.70	0.54	1.31	7.55
Gluten meal.....	15.09	0.39	0.05	15.53
Cotton-seed meal	20.85	3.66	1.65	26.16
Linseed meal.....	16.08	2.28	0.99	19.36
Meat scrap.....	29.01	6.01	0.67	35.69
Wheat.....	7.08	0.96	0.45	8.49
Oats	5.36	0.90	0.45	6.70
Skim milk	1.74	0.26	1.08	2.11
Timothy hay	3.00	0.43	1.17	4.60
Wheat bran	7.56	3.40	1.34	12.30
Wheat straw	0.81	0.30	1.02	2.18
Turnips	0.48	0.14	0.34	0.96

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Feeding highly nitrogenous materials, of course, increases the amount of the most expensive fertilizing ingredient, nitrogen, in the solid excrements, and materially increases the quantity of liquid manure, which necessitates using more bedding, and largely increases the manure heap.

Straw, dry leaves, sawdust, and peat are among the best materials for bedding, because they possess the much prized nitrogen, and therefore have individual value, irrespective of their specific purpose of absorbing the moisture in the stables, and preventing it from evaporating.

Poultry manure, which has not entered into any of the foregoing calculations, is one of the richest, for it combines the undigested residue of food and liquid secretions, which always contain a higher percentage of nitrogen and potash than the solid droppings. We consider that the poultry houses contribute as much manurial value as the barns, stables, or sheepfold.

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In bulk, the cow and pig produce the best supply, but, being poor in fertilizing constituents, are not so valuable, except in the fibrous substances, which furnish humus in soil, and make it capable of collecting oxygen, without which roots smother and die.

Having gained some insight into the fertilizing qualities of manure, I was appalled to read that the annual loss in America, through incompetent handling, amounted to \$690,466,000, or, as Professor Roberts has more personally explained it, a farmer keeping 4 horses, 20 cows, 50 sheep, and 10 pigs should have \$250 worth of manure from the seven winter months; and that the average loss on such a farm is rarely less than \$83.

The latter figures being so applicable to our farm, I delved into more statistics, to find out the whys and wherefores of the perpetually re-occurring terms fermentation, fire-fanging, and leaching, to discover that fermentation is a very complex process, dependent on temper-

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ature, air, moisture, condition of the manure, and microbes.

As I comprehend the subject, there are two families of microscopic organisms known to entomologists as ærobie ferments, which are dependent on oxygen for life, and ærobie ferments, which evidently abhor oxygen, for they die when exposed to air. Atoms No. 1 perform their ordained purpose so energetically as to generate heat that will run up to 150 degrees F.—a temperature which dissipates the material that should be left to form humus, and liberates the nitrogen, which escapes into the atmosphere, and causes the dry condition called fire-fang. Atoms No. 2 work in so slow a way, that, in the center of the heap, or where no air disturbs their normal action, the temperature will not rise above 95 degrees, which is too low, and causes many fertilizing qualities to be converted into unprofitable gases. Leaching is, of course, encouraged where manure is exposed to rain or snow.

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Having mastered these facts, it was quite easy to understand that the carelessly thrown-out manure and litter, which is allowed to form into any sort of a haphazard sprawly heap, must be wasteful, because the irregular surface allows the constant circulation of air through the greater portion of the mass, and encourages the advance of the consuming atoms, and permits rain to form pools and soak slowly away, carrying with it the leachings, rich in organic and mineral constituents.

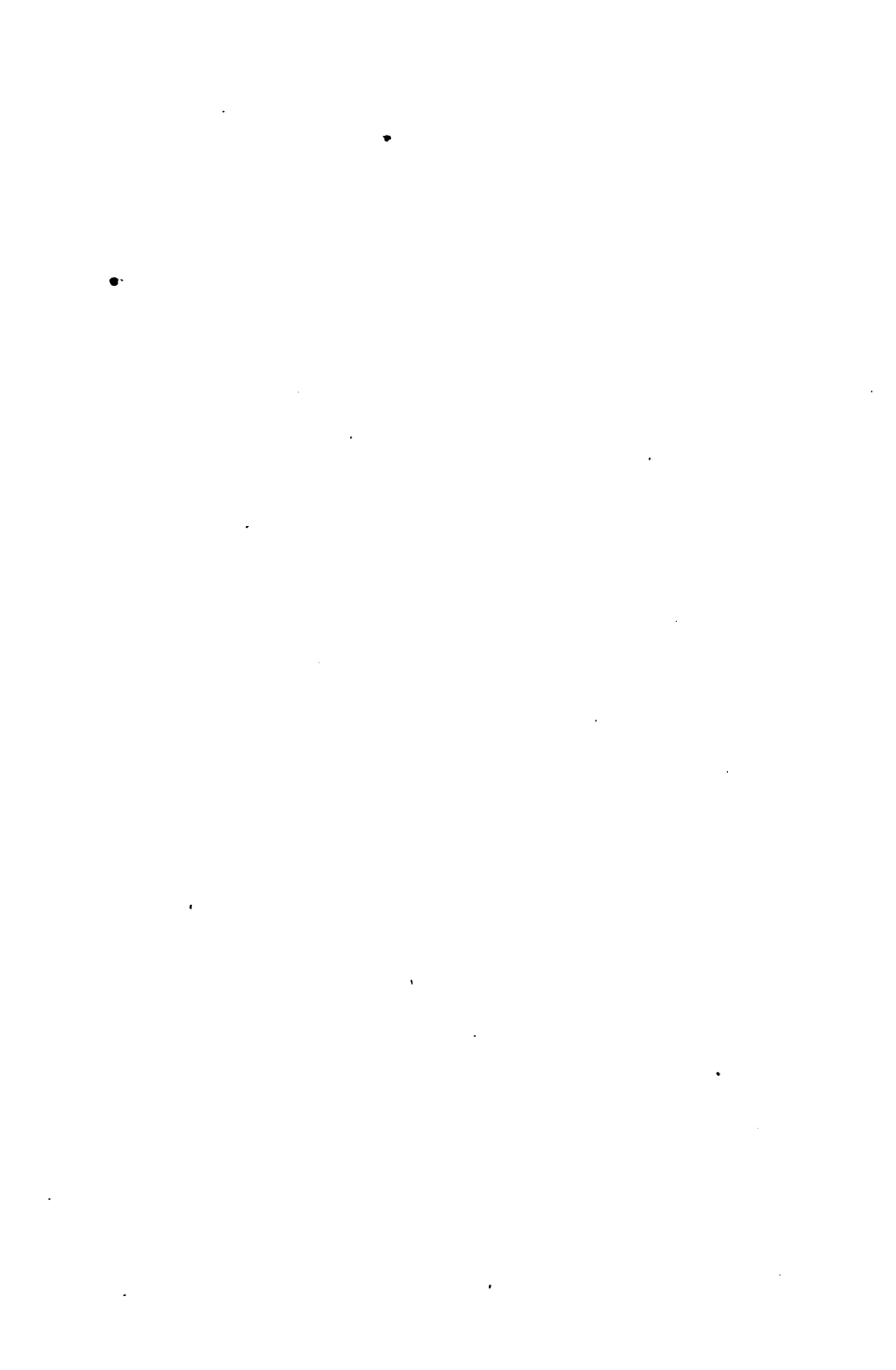
Obviously, to realize the maximum value, methods must be revolutionized; so Mr. Fred was instructed to have a tidying day in the barn-yard, pile up the manure in heaps about 5 feet wide, and 8 or 10 feet long and high, with neatly smoothed surface, so that rain or snow would be easily shed. Of course he was cautioned not to pack down material, as that would give the slow-acting anærobic ferments undue influence. To maintain equal disintegration and amalgamation, the two

THE EARTH'S BOUNTY

families of microbes must be held in uniform control, which can only be accomplished by watchful care, when the manure is so protected from rain, wind and sunshine, as to permit the herdsman full control. The most favorable condition for ripening manure, and rendering available the fertilizing constituents, is constant, uniform moisture and a temperature of about 130.

The memory of things seen as a child, during holidays spent on my grandfather's farm in England, had prompted the placing of drain pipes from stables and cow stalls into sunken barrels, to save the liquids for use in garden and orchard; but, having no real knowledge of the subject, I did not realize that liquids, stored separately, deteriorate so rapidly as to be of little value, though originally they are the richest in fertilizing qualities.

Amongst the collected data on the subject of manure were two pamphlets on French methods, which especially appealed and





CARELESSLY THROWN OUT MANURE RAPIDLY DETERIORATES IN VALUE

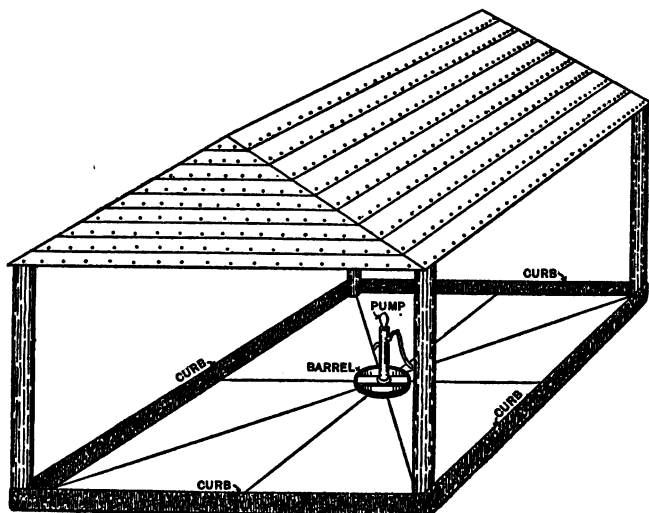
THE EARTH'S BOUNTY

aroused such an admiration for the combined method of manipulating solids and liquids, that we decided to adopt it; for, though the symmetrical and even packing was a decided improvement, it did not approach perfection. I should like to have built the entire concrete cistern and inclosure, but such grandeur belongs to the estate of the really wealthy. Ordinarily prosperous people, on a practical farm, have to consider the ultimate return; and labor necessary for such an inclosure, I was sure, would far outstep the profits. But the poorest farmer can afford a floor and shelter such as we put up, and will reap a full return the first year.

A space 25 feet long and 20 feet wide was cleared, and slightly sloped to the center, so that all drainage would collect at that point, where a large barrel was sunk. Four straight young trees were chopped down, where thinning was needed in the woods, trimmed off, and cut to a uniform length of 15 feet; the larger ends submerged in hot tar, to act as a

THE EARTH'S BOUNTY

preservative, and, when dry, inserted in holes three feet deep, at each corner of the cleared space, as supports for the crib roof, which was made of 3×4 scantling, shingle slats and



THE MANURE SHED.

roofing paper. Then the floor was given a coat of concrete, and a curb, one foot high, was run all around the edge, to prevent leachings escaping from the "dish."

A strong cover was made, and raised two

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inches above the edge of the barrel by small blocks, to allow the free passage of leachings into the barrel. Through the center of the cover a common force-pump was fastened, with a pipe reaching to within a foot and a half of the bottom of the barrel. A piece of hose, six feet long, to attach to the pump, completed the equipment.

As we owned a machine for cutting ensilage, and the engine to run it, most of the straw used for bedding was cut into two-foot lengths, which is most convenient for litter. When straw is used at its full length, it frequently compels a quantity of unsoiled litter being thrown out, which not only wastes material, but materially weakens the value of the manure heap.

Our plan is to use a thick layer of sawdust across the lower end of the stalls, where the most moisture is deposited, and bed heavily. Only the really defiled straw and sawdust is removed to the manure heap, the partly soiled being carted to the pig yard. (A covered

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shed joining the stys, where the growing pigs spend most of their time.) Horse stables are cleaned first, and the collection of sawdust, straw and droppings is spread evenly over the accumulating heap, on one side of the "dish"; next, the clearing from the cow stables, then the sheep and young stock.

Observing such rotation, the heap is kept at about an equally balanced consistency and temperature. After a height of ten feet is reached, another heap is started on the other side of the "dish," the first heap being watched, and kept moist by periodical sprinkling from the barrel. During dry periods most of the leachings are quickly used. Then the contents of the barrels into which the different stable gutters drain is brought over and used; failing that supply, plain water. Excessively wet or humid periods, when more liquid collects than is required by the manure heaps, the partly soiled litter, instead of being given to the pigs, is made into a separate heap, and fed with the leaching; or, if there is a

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good supply of sawdust and leaves at hand, they are used instead of the straw.

The heaps are forked over two or three times, at regular intervals of ten days, as spring approaches, to insure even ripening of the whole mass, and to aid disintegration. The first completed heap is used for frames and garden; second, for potatoes and small fruits.

The manure in the pig-yard and cow-yard is allowed to accumulate all through the winter. Yards being covered, it is protected from rain and sun, and the perpetual tramping of the animals keeps it in very fair condition. In the spring it is carted out to the ground, to be used for coarser field crops—sometimes alone, but frequently in conjunction with poultry droppings, which furnish the qualities lacking in cow and pig manure.

The dropping boards in the poultry houses are heavily sprinkled with dry earth or sawdust, which covers the droppings as they fall from the birds during the night, and arrests

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the escape of fertilizing qualities until the boards are cleaned, which, with us, is every other day. Then every 50 pounds of the clearings are mixed with 16 pounds of acid phosphate, and stored in barrels, to be used on special crops, like onions, cabbage, cauliflowers, and bulbous plants. When we think sufficient has been treated in that way to meet the coming season's requirements, the clearings are spread between layers of sod, or added to the general manure heap after a layer from the young cattle.

The monthly clearings of scratching material, from the main floor of the poultry houses, are added to the general heap, or carted immediately to some specially selected place, which is usually small fruit, young orchard, or strawberry ground.

Wood ashes are saved especially, and used principally on potatoes.

Several authorities advise hauling manure directly from the stables to the land, as it saves trouble and time in handling, and caring for

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a manure heap; but the method does not appeal to me, because such unseasoned material contains constituents which encourage excessive growth of stem and leaf, to the detriment of flowers and fruit. Moreover, it does not allow the balancing of different qualities of droppings, which seems very important especially on old, worn-out farms, where supplying the material in a condition of disintegration furnishes humus much more quickly than can possibly be the case when the bedding is carted out in a semi-solid condition. In fact, expert agriculturists agree that well-mixed and ripened manure, which has been protected from the elements, is a most desirable and profitable land enricher, and W. H. Beal indorses this system in a summary which I quote from a farm bulletin:

There are sound, scientific reasons for the high esteem in which this manure is held. It requires all the fertilizing elements required by plants, in forms that insure plentiful crops and permanent fertility to the soil. It not

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only enriches the soil with the nitrogen, phosphoric acid, and potash which it contains, but it also renders the stored-up materials of the soil more available, improves the mechanical condition of the soil, makes it warmer, and enables it to retain more moisture or to draw it up from below.

It should be clearly understood that when the farmer sells meat, milk, grain, hay, vegetables, etc., from his farm, or neglects to save and use the manure produced, he removes from his soil a certain amount of potash, phosphoric acid, and nitrogen that must be restored sooner or later if productiveness is to be maintained.

The table on p. 129, compiled by Armsby, shows the amount and value of fertilizing constituents carried away from the soil in different products.

If the farmer, instead of selling off his crops, feeds them to live stock on the farm as far as possible, a large proportion of this fertility, as shown above, is retained on the farm;



COMPOST HEAPS OF SOD AND DEAD LEAVES ON WHICH ARE EMPTIED THE SURPLUS LEACHINGS
AND STABLE DRAINAGE

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	Pounds per ton.			Value per ton.				Manu- rial value of \$10 worth.
	Nitro- gen.	Phos- phoric acid.	Potash.	Nitro- gen.	Phos- phoric acid.	Potash.	Total.	
Meadow hay.....	20.42	8.2	26.4	\$8.47	\$0.57	\$1.06	\$5.10	\$5.10
Clover hay.....	40.16	11.2	26.6	6.88	0.78	1.46	9.07	9.07
Potatoes.....	7.01	3.2	11.4	1.19	0.22	0.46	1.87	0.12
Wheat bran.....	49.15	54.6	28.6	8.35	3.83	1.14	13.31	8.23
Linseed meal.....	105.12	32.2	24.8	17.87	2.25	0.99	21.11	7.54
Cotton-seed meal...	135.65	56.2	29.2	23.06	3.23	1.17	28.16	10.05
Wheat.....	37.53	15.8	10.6	6.88	1.11	0.42	7.91	2.03
Oats.....	36.42	12.4	8.8	6.21	0.87	0.35	7.43	3.36
Corn.....	33.06	11.8	7.4	5.62	0.83	0.30	6.75	3.73
Barley.....	39.65	15.4	9.0	6.74	1.08	0.36	8.18	3.03
Milk.....	10.20	3.4	3.0	1.73	0.24	0.12	2.09	0.83
Cheese.....	90.60	23.0	5.0	15.40	1.61	0.20	17.21	0.69
Live cattle.....	53.20	37.2	3.4	9.04	2.60	0.14	11.78	1.18

and "if the business of stock-raising is carried to the point where feed is purchased in addition to that grown on the farm, a considerable addition may in this way be made to the fertility of the farm at an almost nominal cost, since it is assumed that feed will not be bought unless its feeding value will at least pay its cost." This commendable system of indirect fertilizers in feeding stuffs is practised largely in England and other European countries, and accounts for no small share of the profits of stock-raising in those countries.

But it is evident that these advantages will

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not be secured unless the manure produced is carefully saved and used.

Before buying commercial fertilizer, the amateur will be wise to consult neighbors; or, better still, write to different firms advertising such wares, explain, as nearly as possible, the sort of soil, last crop grown upon it, and the one to be grown upon it; and get their advice as to the best combination to use.

CHAPTER SIX

THE ORCHARD

AN old orchard, in fair condition, covered half of the twelve acres we originally rented with the Wilbur homestead. Our first year there happened to be a phenomenally good fruit season. When the trees were in blossom, we reveled in their pink and white beauty without any mercenary thoughts; but when the æsthetic feast commenced to fade, the practical asserted itself, and, in defiance of the adage about not counting your chickens before they are hatched, we speculated on the probability of financial results, which mounted higher as the fruit approached maturity, though there had been lots of quakey days, when little green apples strewed the ground, and it seemed as if Mother Nature was doing a needless amount of thinning.

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Later, thunder showers and the winds brought down ripening fruit, that filled us with apprehension, the strain of which was not relieved until the middle of September. Then a man, who lived in an adjoining village and made a business of buying in orchards as they stood, came up to the house, and offered \$70 for the crop, which I accepted most readily, as my husband's business had taken him to California, and Sidney and I could never have picked and packed the fruit for market.

When the huckster paid me, he volunteered the information that there were a mighty lot of good trees in the orchard, if they were only trimmed up a little; adding that, many a season in the past, he had paid from three to four hundred dollars for the crop. The man received my most devout thanks, for we had considered the orchard as almost hopeless—at least never expecting to get more than enough fruit for our own use from it; but knowing, from hearsay, that the man was an unerring

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judge of trees and fruit, I resolved to appropriate \$25 of the \$75 to use in resuscitating the trees.

The number of flickers and bluebirds which congregated at nesting time suggested hollow trees. Traces of sawdust on the bark near the ground, I learned, were unmistakable signs that the borers were at work. Then there were patches of scaly and moldy growth here and there—all signs that a general overhauling was necessary. The trees had evidently been intelligently pruned and tended until a few years prior to our tenancy, so the main growth was well proportioned, though suckers and water sprouts had run riot. Several of the holes appropriated for nests had undoubtedly been caused by branches being broken off, either by the winds or carelessness at gathering time.

The ground was covered with sod in which clover predominated, and it did not seem necessary or advisable to plow, especially as the old-fashioned custom of piling stones round

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the trees had been practised for years. With the amateur's usual rashness, a drastic onslaught on the trees was planned for the spring. Fortunately, enough practical information had been gained from books before it arrived to prevent such a folly, and to prompt conservative, gradual pruning; for if trees have been neglected several years, and are then ruthlessly cut back, they will devote all their energies, for the next few seasons, to growing new wood instead of fruit.

Not being experts, we concluded to confine our efforts to removing suckers and dead wood, healing neglected wounds, spraying, and checking the decay in hollow places, by cleaning and filling, as suggested in an article on hollow trees which had come into my possession. The necessity of depriving the flickers and bluebirds of their nesting places was a regret, but the trees had to be saved. Eventually, we palliated sentiment and practicalness by mending the trees, and then fastening similarly hollowed branches from the

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woods over or near the original holes, which seemed quite satisfactory to our feathered friends when they arrived in the spring.

Treating the hollow places consisted in scooping out all the loose material collected inside, with a long-handled spoon, when possible; but in some cases the decay had travelled so far, that an opening had to be cut in the tree far below the hole. In either case, when all loose tissue had been scraped away, a small wad of cotton batting was soaked in kerosene, lighted, and dropped in the cavity, to burn out insects and germs. If the cavity was so large as to suggest the probability of the tree's not being able to stand against wind, or the weight of summer foliage, it was filled in with cement. If, on the other hand, the cavity was small after being cleaned out, a piece of wood was inserted like a bung, to close the opening, which was then painted with tar.

When the telltale sawdust pointed out a borer's presence, a strong wire was inserted, and, if possible, the nasty little grub fished

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out. If this could not be accomplished, the bellows-smoker, which we used when handling bees, was lighted, and a few minutes strong smoking resorted to. Then, of course, the crevice was covered with tar or paint.

The long, straight suckers, which sprung from trunk and branches, were all cut off, close to their starting place, but no other pruning was done this first season of reformation.

While the trees were still dormant they were sprayed twice with lime-sulphur-salt wash, as a preventative or cure for the San Jose scale or other pests of the same ilk. Just before blossoming, and again after the fruit set, each tree had a shower bath of Bordeaux mixture. Of course, we extended the same attention to the few pear, peach, cherry and plum trees which grew at the side and back of the house.

The season following all this sanatory work was the off year in the orchard; but yet, the fruit brought only \$3 less than the season before.

All through the year young poultry was





THE RESULT OF SEVERAL YEARS' NEGLECT

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kept in the orchard. Colony houses, being only 6 feet long and 3 feet wide, were very light, having no floors, so easily moved to a fresh place every few days. By such means the orchard was evenly fertilized and coops kept clean.

The future care of the orchard consisted in rubbing off suckers as soon as they made their appearance, moderate pruning in the main growth, to let in sun and air, and liberal spraying.

The second season of such management the same dealer called in August, and offered to give \$200 down for the crop, taking all risk of what might happen before gathering time, and, of course, doing the picking and packing as before. Wanting the money, and having more work than it seemed possible for Sidney and his father (who had just been engaged) to manage, I accepted the offer. Since then, having the necessary help, and a good clientèle of private customers, we handle the fruit ourselves, and have never cleared less than \$108

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on a season, including the Bartlett pears; and profits have run up as high as \$600, which, I think, is especially good for an old orchard from which we had not expected any income.

The majority of trees are winter fruit—Northern Spies, Roxbury Russets, Spitzenbergs, Rhode Island Greenings, and Baldwins, with just a few trees of what our neighbors call Harvesters, a delicious apple, fine, juicy, with a crisp, clean sweetness which is most appetizing when eaten raw. Baked, boiled, or stewed, it retains its flavor, and becomes a uniform, puffy jelly, almost transparent, and just the shade of amber to blend with thick cream.

GATHERING AND MARKETING

As gathering and packing is of paramount importance in keeping fruit, either for home use or for market, it must be carefully executed. It is not possible to give positive dates for gathering the different varieties, because

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locality, soil, and seasons all influence them. The most favorable time is when the fruit has attained its full growth and color, which is several days before it is quite ripe. Apples, in fact all fruit, should be handled with the greatest care. The slightest bruise or scratch starts a condition which will develop rot.

A light extension ladder, a high step-ladder, and an agile boy are the requisites for picking. When possible, choose a bright, cool day, have the boxes and barrels ready, and press all help into the service. Before allowing anyone to pick apples teach them how. Take the apple lightly, turn it slowly, and press upward, so that the stem is severed from the branch and not from the fruit. The stem seems to be nature's seal, which imprisons the life or heart of the fruit. I have no authority for this assertion, except my own observation, but that has convinced me that fruit which retains the stem keeps the longest.

The boy, or whoever may have to do the climbing, should discard shoes, for they are

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apt to injure the bark of the tree, which always causes later troubles. A shallow bag, slung across the body sling-fashion, is the best receptacle for the picker to use, because it leaves both hands free. The work is greatly facilitated if two people can pick, two pack, and a fifth take the fruit from the pickers to the packers. Have two bag-slings for each person picking, so that the collector can take the full one, and hand up an empty one, which saves emptying the fruit into a basket.

The packers and the barrels or boxes should stand side by side, with a box of convenient height and size turned upside down, to act as a table on which to place the sling-bags when full. One person should be instructed to take all the largest apples, the others, the next in size; the really small ones being gently emptied into a receptacle which can be easily moved. We use a hand-cart, with a layer of hay at the bottom.

The first layer of apples is placed evenly, stalk end down, in the bottom of barrels, for

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ordinary commission houses. Above that they are just put in, a few at a time, with no attempt to fix, the barrels being shaken gently two or three times during the filling, to settle the fruit closely together. Then, when quite full, the top is forced into place and the hoops nailed fast.

All our best apples are packed in small boxes, with paper between the layers, because private customers like them better than barrels. The second quality we put into barrels, but they go to regular customers who know that we do no facing, as the first row of selected and evenly placed fruit is termed; we put a layer of hay in the bottom of the barrel, fill it with the fruit, and end with a layer of hay. Having no cold storage, we ship as soon as packed.

What we require for our own use for the winter are packed in boxes and stored in the cellar. The small ones are used for cider and for feeding stock, the latter going into a bin in the root cellar under the feed-house, where

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we keep most of the winter store of vegetables. The old-time custom was to stack apples in the orchard for a few days, the idea being that they needed to "sweat," as the farmers expressed it, before packing; which was a blunder, for, on the contrary, the fruit often heated, and decay was started before it ever reached its storing place.

If only good, sound specimens are carefully handled—not thrown or poured from one receptacle to another, as is often done—packed immediately after gathering, and stored in as cool a place as can be found, but, of course, free from frost, they will keep perfectly. We have several times held over a few barrels for late winter sale, with no better place to store them than the northern corner of the barn, which had been boarded off for an office or store-room prior to our tenancy. Barrels were placed on their sides, and, as extremely cold weather approached, straw was gradually thrown over them, and as late as March we have found them in good condition.

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The cellar for storing fruit must be well ventilated and free from damp, though a cement cellar is apt to be too dry, which causes the fruit to shrivel. In such a case stand a tub or couple of pails of water in the cellar, and do not fail to change it once or twice a month. A dry cellar with an earthen floor is usually about right, though if rapid thaws occur during the early winter, such a floor is likely to become very damp; so watch for such a condition, and immediately put one or two wide, shallow boxes, a third filled with un-slacked lime, into the cellar which will absorb the moisture. Of course no boxes or barrels should ever be placed directly on the floor of any kind of cellar, but always raised about a foot on blocks. Long ago we made a rack, a foot high, of 4 × 4 scantling, to run the full length of the cellar.

Do not wait until fall or even summer to get your supply of barrels and boxes to pack in, for then everybody is bothering the village store for "empties." Collect what you can,

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each week, throughout the winter. Of course, when a large orchard is in good bearing order it becomes necessary to buy barrels wholesale and have them shipped; but the beginner, or people on a small place, who only want ten or twenty barrels, have to depend on their groceryman.

Pears are always better gathered before quite ripe, even the summer varieties for home consumption, as they are very apt to lose flavor, and become stringy or mealy in texture, if left to fully ripen on the tree. The right condition for picking can be gauged by bending the fruit straight upward. If the stalk snaps sharply from the spur, the tree can be stripped; but if it breaks off below the spur, wait a day or two and try again.

The summer pears should be laid out in a dark place to ripen; or, if space is limited, lay in boxes with paper between the layers. Late varieties, to be kept for winter use, should be packed in the same way, only, of course, lids must be nailed on the boxes, and they must be placed in the storehouse or cellar.



AFTER THE SUCKERS AND DEAD WOOD HAD BEEN REMOVED

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Peaches and cherries we have never tried to store, except in the form of preserves and pickles; any surplus being sold in baskets at picking time.

THE YOUNG ORCHARD

By the time we had attained the dignity of really, truly farmers, the old orchard had responded so splendidly to our efforts on its behalf, that we were anxious to plant young trees and enjoy the pleasures of shaping and developing them—of course feeling sure that, in a few years, the pleasure would be supplemented by a substantial reward. The plan was not elaborate; only 5 acres of apples, 3 acres of pears, and 2 acres of peaches.

We had a ten-acre field of good soil, with just sufficient slope to the northwest to make it an ideal orchard-seat, especially as the woods started about 100 feet to the east, affording perfect shelter. Subsequent crops had been corn and potatoes, so the ground was in good

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tillage, which is important, for setting young trees in rough ground is worse than useless. If the selected place for the orchard has not been under cultivation, it would be really a saving of time to postpone planting for two years, especially if the soil is clayey or damp; for, by subsoiling in the autumn, and planting corn in the spring, rye in the fall, to be plowed under the following spring, when it is possible to procure them, wood ashes should be used as fertilizer before planting potatoes, which crop will bring the soil into good condition, and be off the ground in time for early fall planting of the orchard; or, if spring planting is preferred, seed the ground with rye, to again plow under in the spring. Personally, I prefer early spring planting; it seems more natural. Dormant trees must feel transplanting and the necessary root and top pruning less than would trees in full sap.

Early in the winter we decided on the varieties for the new orchard: Yellow Transparent,

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which ripen, in our locality, about the first of July, and Sweet Bough, ready for picking in August; to packing for winter, Baldwins, Winesap, and Roxbury. Pears: Bartletts and Winter Niles. Peaches: Alexandria, Early Crawford, and Late Crawford.

As you see, we chose the old standard favorites, for novelties are too risky for practical purposes. It may pay nurserymen to advertise something new each season, but often the novelty develops some unexpected bad point after a few seasons, and is dropped from the catalogue. Even more frequently varieties with new names vary so slightly from old favorites that nothing is gained by paying the higher price which is asked for them.

After the potatoes were removed from the field, buckwheat was sown. Early in the winter the order was sent into a reliable nursery establishment, with the request to ship about the end of February, to insure their arriving early in March. As soon as weather permitted the buckwheat was plowed under, the ground

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well harrowed, and rows marked off by running a deep furrow with a plow, every 32 feet, first lengthwise and then crosswise, which opened the ground effectually at the points where the furrows crossed, and indicated where the trees were to be placed; though, to insure accuracy, it is advisable to measure the distance and plant a stake to mark it.

When the trees arrive, unpack in some out-house, and, if all danger of severe frosts is over, get large tubs or pans, fill with water, and stand the trees in them, to soften the roots; or, if that is not convenient, lay out on the floor, and cover the roots with wet burlap. Before planting examine the roots. Dead wood, or spindly growth, over five inches should be cut just below the first out-branching rootlet. Use a sharp knife, and make the cut from the under side, slanting from the heart out, so that the exposed surface will come in contact with the ground, when the tree is set in place; for if the cut is made in such a manner that the exposed surface is

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uppermost, the moisture may penetrate and rot the entire root.

Having deprived the tree of some of its feeding rootlets, it will be unable to collect sufficient food to adequately nourish the top growth, and the result would be scant foliage and weak plants, susceptible to disease; so, to equalize things, the top growth must also be curtailed. Cut just below an eye on branches, and don't leave any branch over 8 inches long.

You many wonder why any pruning should be done at this time. Well, primarily, because the tree cannot be removed from its original growing place with all its roots and rootlets intact. Furthermore, the trimming back strengthens the tree, and stimulates fresh, vigorous growth in its new home.

When placing the tree in the ground, spread the roots out on the soil as nearly in their natural form as possible. Then firm the earth all



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round them. The hole must be deep enough to sink the tree about two inches deeper than the old surface mark. It is well to allow the tree to slant slightly toward the southwest at planting time.

When the planting is all finished, the entire ground, to within two or three feet of the trees, can be utilized for other crops. Corn, potatoes, and other vegetables are all available, but none of the grain crops must be used, except under special conditions, because they interfere with cultivation. Fruit trees require large quantities of nitrogen, which is best supplied by growing some of the leguminous crops, like Canada field peas, soy beans, and clover, alternately with crops of the vegetable class, which should be followed by rye or buckwheat for winter stands.

If no vegetables or hoed crops are grown in the orchard, it must still be plowed every spring, and harrowed at intervals, until mid-season, or, in other words, until the season's growth is made. As with other crops, con-

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stant stirring of the surface soil, to a depth of two or three inches, stimulates growth, because it liberates the constituents of the soil which constitute plant food. Discontinuing cultivation checks growth, and allows that already made to mature sufficiently to withstand winter frosts.

Immediately seeding the ground, after the last cultivation of the season, with rye or buckwheat, holds the soil's fertility by preventing leaching, provides a mulch for the winter, and adds humus to the soil when plowed under the following spring. H. P. Gould, assistant pomologist of the Government Pomological Bureau, explains the necessity of tillage and cover crops as follows:

The use of cover crops in connection with the growing of fruit is closely allied to the fertilizer problem, inasmuch as they are both fundamental factors in soil fertility.

The producing capacity of the soil is as much dependent upon its physical or mechanical condition as it is upon the amount of

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plant food it may contain. The chief factor governing the physical condition of the soil is the amount of humus or decaying vegetable matter it contains. It is in this connection that cover crops may be made to serve so important a purpose.

Cover crops are of two classes: Legumes, which have the power of gathering nitrogen from the air, so that when they are plowed under and decay, the soil is actually richer in nitrogen than it was before; and the non-nitrogen-gathering plants, which, when they become incorporated with the soil, leave it little richer in plant food than it was before, though the presence of the decaying vegetable matter thus added to the soil improves its physical condition and makes it more productive.

Of the leguminous cover crops, the various kinds of clover are, perhaps, of greatest value, though the question of value is somewhat dependent upon location and other conditions. Other crops of this class, frequently used for



GRAIN CROP IN YOUNG ORCHARD

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the purpose in question, are vetch, Canada field peas and several others. Rye, buckwheat, rape, and the like are the more common non-leguminous plants used for cover crops.

Other things being equal, the ideal time to sow the cover crop is at the last cultivation of the plantation for the season, allowing it to remain upon the ground until the first working of the soil the following spring. Various factors, however, will influence the details of management. If, in the judgment of the grower, the soil needs more nitrogen, one of the leguminous crops should be sown. If only the maintenance of the humus is necessary, together with the protection of the soil during winter, then one of the non-leguminous crops will serve the purpose.

As a fundamental factor in progressive orchard management, systematic tillage is a practice of comparatively recent introduction. While the practice has become quite general during the past few years, and is growing more so, the principles underlying the opera-

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tion are not so fully understood as they should be. A better understanding of these principles will make the operation more effective, because it will be more thorough.

The offices of tillage are several. Among the most important ones are:

1. The setting free of plant food, by increasing the chemical activities of the soil.

2. The soil is made finer, and hence presents greater surfaces to the roots, thus increasing the area from which the roots can absorb nutriment.

3. The surface of the soil is kept in such condition that it immediately absorbs all the rain that falls during the summer, when it is apt to be dry. Little is lost by surface drainage.

4. Moisture is conserved thereby. Where the surface remains undisturbed for weeks, the soil becomes packed, so that the moisture from below readily passes to the surface and is evaporated, thus being lost to the growing crop. If the surface is kept light and loose

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by tillage, so that the capillarity is broken, but little of the soil moisture comes to the surface, and evaporation is not great. In this way nearly all the moisture remains in the soil, where it can be used by the plants.

5. Thorough tillage has a tendency to cause deeper rooting of the plants. The surface of the soil is made drier by tillage, during the early part of the season, than it would otherwise be; hence the roots go where the soil is moist. The advantage of deep rooting during drought is obvious.

The relation of plant food and moisture to the welfare of crops, and the influence of tillage thereon, should, perhaps, receive some further attention. Doubtless all farm crops—not excepting the tree fruits—suffer more from lack of moisture than they do from lack of plant food in the soil. All of the nourishment which the plant gets from the soil is taken in solution, and unless there is an abundance of soil moisture to dissolve the mineral plant foods, it is evident that their presence in the

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soil, even in limitless quantities, could avail nothing for the good of the crop. The ideal tillage, then, is that which begins as early in the season as the soil can be worked, while there is still an abundance of moisture in it and continues until mid-season.

The special conditions under which grain crops are allowed in the orchard are when soil is very rich, and young trees are being forced into abnormal growth. Then the grain crop is used to eat the excess of plant food. Healthy and vigorous trees, that have arrived at bearing age, yet show no indication of fruiting, can sometimes be awakened to their duty by this means. At others, root pruning has to be resorted to. This consists in digging a circular trench, from 3 to 6 feet from the tree stem, to a depth of from 2 to 4 feet, and cutting all the roots that are encountered. As soon as the entire circle is accomplished round the tree, replace the earth, being careful to firm the soil round the roots. If this process is accomplished late in July, or early



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in August, it will promote the formation of fruit buds for the next season.

Every season after planting judicious pruning of top growth is necessary, for several reasons, the principal of which are equal distribution of weight, symmetrical form, best adapted to fruit bearing and ripening, and the curtailment of rampant growth, which is detrimental to fruit production. The young tree is prone to throw sprouts from the main stem at the same height, but on opposite sides. This seems of no importance to the uninitiated until years afterward, when the sprouts have developed into heavy main branches. Then the most ignorant person can realize the danger of the trunk of the tree being split in half by the drag of the branches.

Amputating large limbs is a drain on the tree's vitality, which usually retards its fruitfulness for several seasons; therefore, the formation of the young tree must be most carefully watched and controlled. The first branch should start from the main stalk, about 3 feet

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above the ground; the next branch several inches higher, and a little further round the stalk, to the right or left, but not directly opposite; and so with all three or four main branches. Let each be a little higher, and at a slight angle to the one preceding it. Then, as the tree grows, the weight will be evenly distributed. The main stalk should also be cut back several inches each season. Cuts in pruning should always be made immediately above a bud; otherwise, the branch will die back to that point, and dead wood will attract the fungoids of decay.

The most important reason for pruning regularly is that fruit trees throw buds one season and develop the following, and fruit is only borne on one or two-year-old wood; therefore, if trees are neglected for two or three years, they will bear all their fruit at the extreme ends of spindly branches, where it cannot be fully nourished; and rectifying the neglect means destroying the next year's buds.

THE EARTH'S BOUNTY

If indiscreet pruning has been practised in the past, large limbs may have to be removed in old orchards, in which event cut close to the trunk or main limb, from which one is to be severed. Saw from the under side upward, about a third through the branch; then start again from the top, about an inch further down the branch. Then, when the weight of the branch bears it down as you cut, the first cut will prevent the bark of the remaining limb from being torn. After the branch is down, trim the jagged stump level, and cover the wound with tar or white-lead paint, to keep out all foreign matter until it heals. Leaving short stumps, where branches are cut off, is the cause of trees becoming hollow. Rot starts in the exposed portions, and travels through to the heart of the tree. Whenever any part of



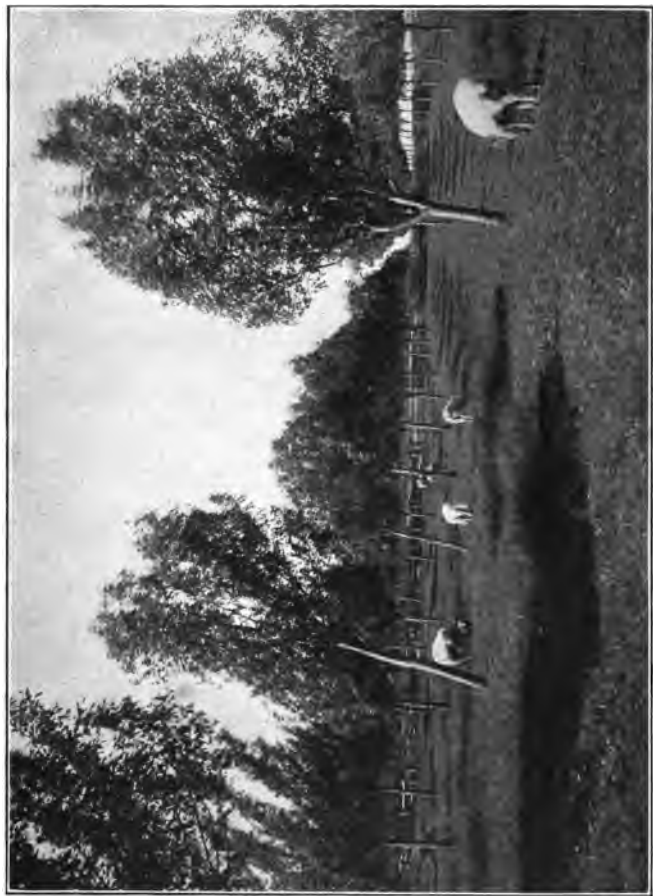
THE EARTH'S BOUNTY

the bark of a tree gets injured, at once apply tar or paint.

Stalks of young trees should be wrapped with burlap, paper, or old rags, to prevent rabbits or mice gnawing the bark in the winter.

One of the advantages of starting and developing your own orchard is being able to prevent diseases and parasites becoming established before you have a chance to fight them. If preventatives are consciously used from the beginning, there will be little trouble in fighting an epidemic, should one assail the orchard. The two most useful mixtures for fighting orchard enemies were vaguely referred to when relating the methods used to rejuvenate the old trees, but the worker in a new orchard, if truly interested, should know at least the name and appearance of a few of the most prevalent troubles.

The San Jose scale, which has been the great scathe of recent years, is indicated by a white, scaley substance on old wood, and reddish-brown spots on young wood. Canker is also a fun-



SHEEP KEEP THE GRASS SHORT AND FERTILIZE THE GROUND

THE EARTH'S BOUNTY

gus disease. It gains access to the tree through a wound. As it spreads, the bark is liable to crack completely round a limb, especially on young trees. The codling moth is about half an inch across the wings, flies at twilight and night, lays its eggs on the surface of the apple, in the calyx, and on the leaves; and when they hatch, the minute caterpillar eats its way into the apple, burrows round the core while growing to its full size of three-quarters of an inch, when it eats its way through some portion of the fruit. There are usually two broods each season, the second brood wintering in the fruit. That is one of the reasons why the droppings should be removed, instead of being allowed to rot on the ground. The curculio is a small beetle which bores into the fruit to eat, and often lays its eggs, which hatch, and work to the core. The apple maggot is a small black fly that also bores and lays eggs that hatch and devour pulp just beneath the skin of the fruit.

There are many more destructive larvæ and fungus diseases to combat, but as the same

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preventatives and care affect them all, it will only be necessary to give the recipes for the different spraying mixtures.

The lime-sulphur-salt mixture for the San Jose scale and sucking insects, to be used in winter or very early spring, is made by slack-ing 12 pounds of stone lime with boiling water, in which 10 pounds of flower of sulphur has been mixed. We put the sulphur into a large pail, mix it into a paste by gradually adding water, until it is of a creamy consistency, and immediately add it to the lime. Altogether, 30 gallons of boiling water are to be used. Some people say the salt is of no curative value; others say it is; and most decidedly it helps the other ingredients to amalgamate, so we always put it into the barrel with the lime. The mixture must boil for two hours and be kept hot until used, or it will clog the nozzle of the spraying machine.

Bordeaux mixture for fungoids, to be used before or after blossoming time, can be bought ready mixed, and will save trouble when only

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a small orchard has to be treated. If you wish to make it, the ingredients are: Five pounds copper sulphate or blue vitriol, 5 pounds of quick lime, 50 gallons of water. Tie the cop-



KNAPSACK SPRAYER.

per sulphate in cheese-cloth, and suspend in a pail of water to dissolve. Make a paste by slacking the lime with water, strain, place the lime paste in a narrow, deep vessel, add the copper sulphate, and churn until thoroughly mixed. Then add the full quantity of water.

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Kerosene emulsion is simple, and very useful for trees, vegetables and flowers. Put a gallon of sour milk and two gallons of kerosene into a vessel, and churn until a creamy emulsion is made.



BARREL SPRAYER.

Whitewash, to which kerosene and salt have been added, makes the trunks of trees look clean and tidy, and helps to keep borers away.

For garden or a few fruit trees, a knapsack spraying outfit can be used, and only costs about \$10; but to do really good, quick work

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in an orchard, it is economy to purchase the barrel machine, which has a strong agitator to prevent the ingredients settling, and a pump to force the mixture through long pipes, capable of reaching the center of large trees. The apparatus, mounted on wheels, costs about \$25.

Always remember that spraying is of little avail unless done thoroughly, for one affected spot that escapes the spray will contaminate whole trees within a short time.

The same general care and treatment applies to pears and peaches, the only difference being in planting. Pears should be 20 feet apart; peaches 14 feet apart.

CHAPTER SEVEN

DAIRY AND YOUNG CATTLE

It is humiliating to own that accident and natural evolution have had more to do with our success than perspicacity or logical reasoning, but it is evidently true, for, in conning over events, it becomes apparent that branch after branch of husbandry has been developed without any premeditated plans.

Originally, we bought Rachel because a country home without a cow is incomplete. Then, when Daisy arrived, she was such a dear little calf we could not let the butcher have her. When she came to milking age, being a pure Jersey like her mother, cream predominated, and we had a superabundance of butter. Two private egg customers were offered a few pounds each week, at forty

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cents a pound, and instantly accepted. Subsequently others asked if we could not supply them, and then another cow was bought, and then another, until eventually a dairy herd was established.

When milk from even the three cows had to be set for creaming, the inadequacy of pans became apparent; so a cream separator was purchased, which, of course, gave us more fresh skim milk than we could possibly use for the poultry, and we concluded to buy one or two calves—an easy matter in our vicinity, for nearly every farm keeps cows, and sells the milk wholesale to a man, who collects for a firm which runs restaurants in the city. Therefore calves are at a discount, and are either sold at fifty cents apiece, as soon as born, or killed. Mrs. Fred loves all young things, but calves especially; and her second girl, Edith, then about twelve years old, resembled her mother in this respect. So they aided and abetted the new venture.

It is surprising how little difference a few

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young cattle seem to make on a fairly large farm, and how soon they reach the marketable age. Calves which cost fifty cents, and perhaps another two dollars for feed, and can be sold for at least seven dollars, and frequently eleven, within seven weeks, are obviously profitable. Then it seemed a pity to kill off well-bred heifers, and a few were kept for two years, at an approximate cost of \$22, and sold at an average of \$50 each after their first calf.

Hardy males are kept from two to three years, and sold for prime or, as it is frequently called, baby beef, bringing, on an average, \$90. Our estimate for feed consumed, and care, is \$40, which leaves a clear profit of \$50. I think this proves that a butter trade, supplemented by young stock raising, is bound to be profitable; especially as the estimates quoted leave an ample margin for decrease in feed and increase on sales. Besides which, feed of calves, so long as it consists of milk, costs us nothing, as the butter



YOUNG JERSEYS—"GRADES"

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produced by the cows pays all the expenses, and leaves a surplus of \$60 a year.

Moreover, the manure has not been considered, and, as you know, it is estimated by experts as worth about \$20 per head for milk cows and stock ranging from nine months to two years old. Without doubt, dairy and young cattle are lucrative, and splendidly helpful in the work of renovating an old, worn-out farm, which is usually the only class available to people of moderate means.

The mere mechanical action of milking can be learned in a few days by man or woman; and from the first day the first cow is bought, household expenses are so materially reduced, that even a disheartened amateur, with pessimistic tendencies, will feel assured of ultimate success, as every meal will demonstrate the fact that the home is becoming self-supporting.

Of course, keeping cows just as milk producers is profitable, and may be more successful for people who have no affinity for baby

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animals; but it seems to me that selling milk at wholesale prices of $2\frac{1}{2}$ to $3\frac{1}{2}$ cents a quart, is hardly worth while. Buying or establishing a milk route necessitates a large capital for good will, stock, carts and horses for delivery, and much help of a class which it is difficult to procure and manage. In fact, it is the class of dairying which preëminently belongs to the native farmer, with unlimited strength and an aptitude for business. Such men are usually firmly established in every neighborhood, long before the amateur's invasion.

Really first-class home-made butter is a rare luxury, demanding a special standard price the year round, irrespective of market fluctuations. If there are only one or two pounds to spare at first, the business can be started, and customers corralled even before the second cow is bought. The young cattle are almost a necessary adjunct to prevent waste.

For the family, and where butter is to be the ultimate dairy specialty, Jerseys and Guernseys are the best breeds, because their

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milk is the richest in butter fats. Holsteins are essentially the milkman's cows, their yield being stronger in quantity than in quality.

Rachel was of high degree, with a long line of prize ancestors, and her becoming my property was the first act that showed our landlord's kindly feeling and good-naturedness, for she would have brought much more than the \$75 we gave for her; but she had been a pet, and there was a desire to keep her within visiting distance, and help us to a dear, gentle creature, who would be patient with my inexperience.

Naturally, having started with a thoroughbred, every effort was made to maintain the standard. The next cow to be bought was a sister of Rachel's. Then a little later, when two more were wanted, we had to get them from a farmer with mixed stock; but we were able to pick two in which Jersey blood predominated. The same selection was observed with all subsequent additions to the herd, and, having the privilege of breeding all such cows

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to Mr. E.'s bull for a fee of \$5—on the understanding, of course, that the father's pedigree should not be attached to any of the progeny—all the heifer calves we raised were an improvement on their mothers, and what are called, technically, "high grade" animals.

Rachel, Hester, and Daisy's calves were, of course, thoroughbred, and entitled to all the honors which their parentage bestowed; though I must own that many of their plebeian half-sisters were worthy of quite as much personal respect as utility cows.

Points to be considered, when selecting a dairy cow, are family record as milk producers, and her own ability in the same line. The greatest advantage the practical farmer gains from buying thoroughbred stock is the fact that breeders of such animals keep records, and the man who has only grades rarely, if ever, knows much about respective values, beyond the fact that one cow gives more milk than another. It has been conclusively proven that not one-third of the cows in the average

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dairy herd return a profit, and, therefore, would be banished if the owner were not so careless in the matter of testing and measuring individual yields. It is quite common to hear a man, with a young cow for sale, say that her mother was a fine milker, or that she promises to be as good as her mother; but he seems to forget that she owns a father, and that more than half of her good or bad qualities are transmitted from the paternal side. It is as important to know what kind of a milker the father's mother was.

In this country many people used to laugh at pedigree, and considered thoroughbred animals no better than others; but during the last ten or fifteen years there has been a gradual change, as the results of breeding carefully selected animals have been demonstrated. Probably the early scepticism had some excuse, for rash enthusiasm prompted many people to import animals with pedigrees, without any investigation of the owner's credentials, and there are rogues in all callings.

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Furthermore, "prize winners" and "thoroughbreds" were looked upon as synonymous terms, which they seldom are, when considered from the practical standpoint.

For show specimens, the most symmetrical, showy animals, or birds, are chosen, regardless of constitutional strength or productiveness. Then, when such specimens are the first to be brought into a neighborhood, there is often ground for complaint. Agricultural shows are of great value, for they are object lessons that teach correct type, and awaken competition among farmers. The man or woman who becomes interested in capturing blue ribbons will study how to grow the most correctly formed animals, and, in so doing, is sure to discover the principles of selection and mating, to improve practical points. Don't misunderstand me—all show animals are not without practical value; but naturally, beauty comes first. One thing is sure—the exhibitor, if also the breeder, will have good, thoroughbred stock for sale, and will have

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been in the habit of keeping market and butter records, so that he can show the business qualities, as well as the pedigrees, of his animals.

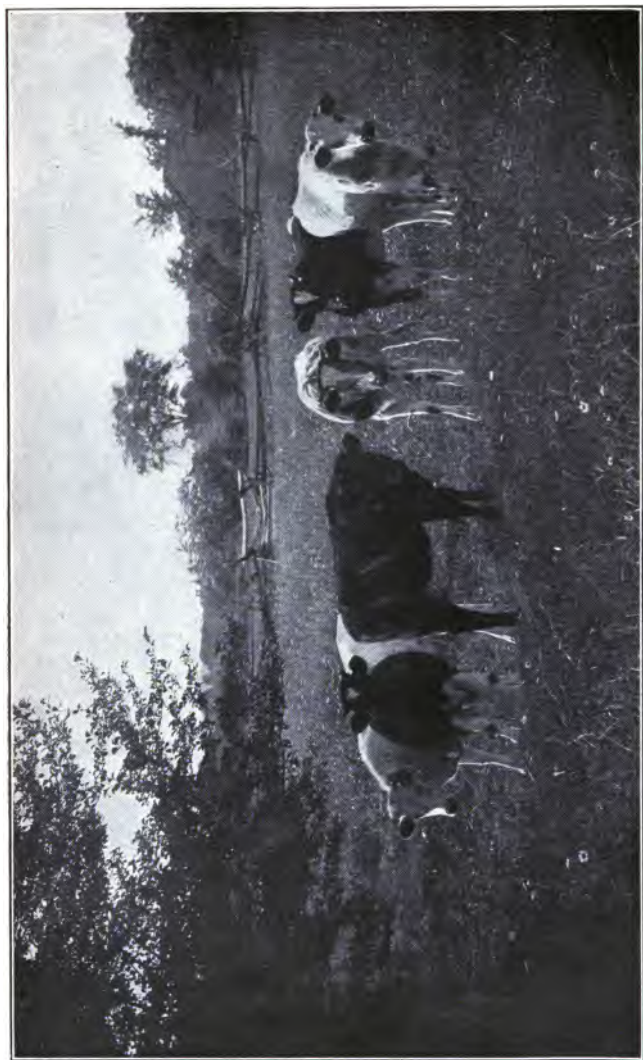
To intelligently use any of the tests for estimating a cow's butter value, some knowledge of the constituents of milk is necessary. Professor Pearson describes milk as a whitish, opaque liquid. To the ordinary observer it appears to be a perfect solution, and is commonly regarded as such, being bought and sold by liquid measure; but, when placed under the microscope, it is seen to consist of a clear, transparent fluid, containing many minute globules of various sizes. The fluid part, called the milk serum, consists of water, and all the other constituents of milk, except the fat; and these other constituents, although solids, when separated and dry, are mostly all dissolved in the water, but part of them is in a state of fine suspension or partial solution. The globules are little bodies of pure fat scattered through the serum and not dissolved.

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They are semi-solid, and form, with the serum, a mixture called an emulsion.

The solid constituents present in the serum in largest quantities are sugar and casein. Albumen and mineral matter are present in small quantity, and there is also believed to be a little fibrin, resembling the fibrin of blood. In milk there is more sugar than any other solid component. The milk sugar can be separated from the solution, and brought into a solid form; as sold, it resembles powdered white sugar. It is used, to a considerable extent, by druggists; also by manufacturers of certain proprietary foods, especially those for infants.

Sugar is the constituent of milk which undergoes the greatest change when milk sours. Casein and albumen of milk are the chief nitrogenous constituents, and are generally referred to as including all of this class of substances in milk. They belong to the general class of foods which includes the lean meats and white of egg. Acid, or rennet, causes casein to coagulate, forming curd, and,



MIXED HEIFERS

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as such, it is one of the chief ingredients of cheese, constituting about one-fourth of that important food. The albumen may be coagulated by heat. The mineral matter in milk, called ash or salts, is the part that remains when milk is evaporated to dryness and burned. This consists chiefly of phosphates and chlorides of soda, potash, and lime.

It is well known that when sugar is dissolved in water, the solution is less limpid than pure water, and if many small bodies, a very little lighter than water, were thoroughly mixed into the solution, their rise would be more or less retarded by the stickiness of the surrounding fluid. Milk might be compared to a thin sirup, with many fatty and light particles floating in it, as just described. It is viscous, or sticky, because of the solids held in solution and suspension; and this viscosity, together with fibrin, has a considerable effect in retarding the rise of the fat globules and the formation of the cream layer. The older milk is, the more effective are these

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forces. The fat globules are so small that one drop contains many millions of them. It is said that if a person should attempt to count the globules in a drop of milk, it would take ten years of his time, provided he counted at the rate of 100 per minute, and worked ten hours per day, six days every week. Such a number is too large to be appreciated. The globules average about one ten-thousandth of an inch in diameter, and twenty-five of the average size, placed side by side, would about represent the thickness of ordinary writing paper. Globules of different sizes are found in the milk of any cow, but, with certain breeds, the sizes average larger than with other breeds. The milk of Jersey and Guernsey cows has this peculiarity, which explains why the cream rises so readily on it—large globules naturally being able to get to the top more quickly than small ones, many of which cannot rise at all.

One hundred pounds of average milk contains about the following amounts of the dif-

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ferent constituents: 87 pounds of water, 4 pounds of fat, 5 pounds of milk sugar, 3.3 pounds of casein and albumen, and 0.7 pound of mineral matter or salts.

But the quantities of the constituents vary between wide limits. The total solids of milk, meaning all the constituents except water, may be as low as 10, or as high as 18 parts in 100. This variation is due to several causes. The fat varies in quantity more than any other part of the milk, running as low as about $2\frac{1}{2}$ parts in 100, and as high as 8; the larger the proportion of fat, the richer the milk is said to be. Most of the States, and many cities, have a legal standard for the composition of milk, and any milk falling below this standard is legally regarded as adulterated, although it may be, in fact, the natural product. The laws usually require 3, or $3\frac{1}{2}$ per cent. of fat, 9, or $9\frac{1}{2}$ per cent. of "solids not fat." (This term is commonly used to designate all the solid substances of milk other than fat.) The total solids required thus

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vary from 12 to 13 per cent., according to different laws; which means, of course, that in every 100 pounds of milk there shall be 12 or 13 pounds of solid matter. These legal requirements are justified by the fact that it is the solid matter, and not the water, which gives value to milk.

The fact that the standard so often relates to the proportion, or percentage, of fat, and the popular impression that the milk is without value after the cream has been removed, lead some people to think that fat is the only valuable part of milk. This is a great error. The several other constituents are valuable; for example, casein is one of the cheapest forms of nitrogenous food, and is more nutritious than similar compounds in many other foods. It is, of course, safe to judge of the quality and value of milk by the fat it contains, because, if milk is poor, from either natural or unnatural causes, the quantity of fat will be affected at least as much, and oftentimes more, than any other constituent.

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The Babcock test for butter fat is simple, accurate, and costs very little. We bought what, I think, was the smallest outfit for \$6, and it consists of four bottles, one pipette for measuring the milk, another measure for the sulphuric acid, and the machine itself. The operation is simply to fill the pipette up to the line indicating the required quantity—18 grams, pour it into the test bottle, measure the sulphuric acid, add to the milk, shake until it turns dark. Then fit the bottle into the machine, neck toward the center. Use a separate bottle for the milk from each cow. When all are in place, the handle of the machine has only to be turned rapidly, and the joint action of the acid and the centrifugal force drives the heavier constituents to the bottom, and the fat particles, which are the lighter, into the neck, where the exact amount is indicated by the scale on the bottle.

When a new cow is bought, or when one of our own raising comes into milking, we use the test night and morning, for one week, in

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each of the first three months. The accepted calculation, by which the amount of butter can be estimated, is to add one-sixth to the amount of fat registered on the bottle. The daily test is tried again during the eighth month, with a young cow; after cows have established records, twice in every month. Weighing, testing, and booking amounts absorbs very little time, and gives such a clear proof of the animals' respective values that no one can possibly grudge it. If small farmers would only observe a rigid supervision of returns, they would be surprised to find the difference in profits; for, of course, no one wishes to keep animals who do not give a fair financial return for feed and care.

STABLING COWS

Even when only one cow is to be kept, she must have a sanitary stable; otherwise the health of the entire family is endangered. Cush needs at least 900 cubic feet of air

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space, and a comfortable stall of from 3½ to 4 feet deep. Stanchions we have never used, because they seemed cruel to me. The cows are just hitched by a chain. Many people declare that a cow will break her legs or get fast in some way, which is quite possible, if the poor animal has slept in a pillory all the nights of her life; but by allowing only a short tether at first, and gradually increasing it, she will learn how to manage what allows her the luxury of a natural position during the night.

Concrete floors, well drained, and heavily covered with good straw, are the best beds; and, so long as there are plenty of windows to admit light, sun, and air during the day, when all the litter is removed, quite sanitary. The regular, stiff stable broom should be used to brush out the floors; and, when weather permits, turn on the hose and swab out once a week. The walls and ceiling, if of wood, should be whitewashed two or three times a year. The new, thoroughly well equipped

THE EARTH'S BOUNTY

cow barns are delights, with their porcelain tiled floors and fittings; but I doubt if any but the large estate will ever be able to afford them. And, fortunately for us practical folks, healthful quarters depend more on light, air, and rigid cleanliness than appearances.

FEEDING

When we had only Rachel and Daisy we fed chopped hay, well steamed and mixed, with ground feed (corn and oats), and wheat bran; for fodder, corn stalks and hay, in the winter, and pasture in the summer. Increase of farming operations and the silo gradually changed our ideas.

Now milk cows have mash, ensilage, and hay, from November to April; mash and pasture, supplemented by soiling, from April to November. The ground feed and wheat bran are mixed, and three quarts used night and morning, for mash, to which one tablespoonful of salt is added. Once a week, roots—



CREAM SEPARATOR

THE EARTH'S BOUNTY

carrots or mangel-wurzels as a treat. In April mash is gradually reduced, until about the middle of May, when it is entirely eliminated from the rations.

The estimated quantity of green forage necessary for each animal, when the silo system, alone, is adopted, is 110 pounds for every 1,000 pounds of animal. As you know from the chapter on crops, we sow Canada field peas, soy beans, millet, rye, and clover, as much to use for soiling as for the silo or hay; so that there is a constant succession of crops from April to November, on which the milk cows are fed almost exclusively, as they are only allowed the range of summer pasture for exercise, and the spring brook, in which they delight to stand, knee deep, on hot days.

MANAGEMENT OF THE COWS

During the last two weeks in March the cow barn is opened five minutes earlier every morning, until the time is changed from six

THE EARTH'S BOUNTY

to five o'clock. Each cow is given her mash in turn; and then, commencing with the first fed, each has her burlap blanket taken off, her udder wiped with a damp cloth and then a dry one, and is milked. The feeding, Sidney does. After that he washes his hands, and slips on a long linen coat, which buttons at wrists, and straight down the back, like an old-fashioned smock, entirely enveloping his clothing. The stable man strips and wipes the cows off, so that Sidney's hands are not brought into contact with any defiling influences before milking.

We have two or three milk pails in use, and, as soon as he has drawn a cow's milk, the pail is taken to the spring house, weighed, and immediately strained.

The milking over, each cow is given her allowance of fodder, and left in peace for about half an hour, whilst the men are feeding other animals. Then they are turned out into the pasture, the stalls cleaned, and left wide open, to air, all day.

THE EARTH'S BOUNTY

Green fodder is put into a rack, stationed at the end of the pasture. At four o'clock, until the end of May, then at five o'clock, they are brought up, and given mash or fodder, milked, and left for the night with full racks of hay.

In October the morning hour is again slipped around to six o'clock, and the daily exercise is limited to the covered yard, until about 9 A.M. Noon feed is gradually changed to ensilage, the rack being moved from the pasture to the yard, which makes the cows anxious to go up when the gate is opened. As the days shorten, they are stabled earlier at night, but, having a covered yard, even in the most inclement weather they can be out whilst cleaning and airing is being done in the stalls, and yet be sheltered.

The spring brook furnishes an unlimited supply of pure, clear drinking water in the pasture in the summer. During the early winter water is piped to a trough in the yard, which is kept clean, and free from all mossy

THE EARTH'S BOUNTY

growth. After severe frost sets in water is carried by the pailful to each cow three times a day, for plenty of pure drinking water, at all seasons, is most imperative. Large lumps of rocksalt are kept in the yard, so that the cows can help themselves at will.

All throughout the year every cow is groomed twice a week.

THE DAIRY

Milk, cream and butter are extremely susceptible and absorbs odors, so faint as to be imperceptible to the average person. Some special place must be devoted exclusively to dairy work. We are fortunate in having a spacious spring-house, with a floor three feet below the ground, a stone gutter, two feet deep and wide, running all round the four sides, which is fed from a spring which furnishes a constant stream of ice-cold water, so far below freezing point that the flow is never stopped. The roof, which is double,

THE EARTH'S BOUNTY.

is eight feet above the floor, and the whole house is so well shaded by a large elm tree, that, even on the hottest day in summer, there is hardly any change in temperature within its stone walls.

When the last pail of milk has been brought down from the barn the separator is started, as the work is best accomplished whilst the milk is still warm. The action of the separator collects the fatty constituents of the milk by means of centrifugal power. The cream particles, being lighter, are forced to the top, whilst the milk, being the heavier, is drawn down to the level of the revolving disks in the center of the machine. Outlets are arranged at the respective heights, the cream flowing from the top, and the milk from the lower. My own experience has been with a hand-power De Laval machine, which is simplicity itself. All the operator has to do is to pour the new milk into the opening at the top of the machine, put a vessel under the mouth of each outlet tube and turn the crank.

THE EARTH'S BOUNTY.

When the skim milk has been carried out to the young stock, and the cream put to cool, the machine may be taken apart and washed in a few minutes; for there are no intricate fittings or corrugated surfaces to clean.

We have large jars for the cream, which are kept standing in the gutter; for, to make good, well-flavored butter, the cream must be kept cold, to check the growth of undesirable bacteria, until ripening is desired. After the cream is poured into the jar, stir for a few minutes, to insure its being uniformly cool. Use a glass thermometer, specially made for dairy work, and, when the temperature has fallen below 60 degrees, the cover can be put on the jar, which should then be enveloped in a thick white cloth, the ends of which should reach the water.

Warm cream from the separator must not be added to the chilled cream until it has been reduced to the same temperature. All cream being held over for butter, should be stirred for a few minutes every day.

THE EARTH'S BOUNTY.

Though cream has to be kept at such a low temperature that souring will not develop naturally, it is necessary, for flavor, that it should be sour when churned; and, to produce the exact condition most advantageous to butter making, what is called a starter has to be used; which is simply fresh skim milk, kept at a temperature between 70 degrees and 80 degrees, which will turn it within twenty-four hours. To make a good starter, the milk should turn into a jelly that will fall into sharp-edged pieces when broken. Before, or after, that exact point in the process of souring, conditions are present which mitigate its value as a starter.

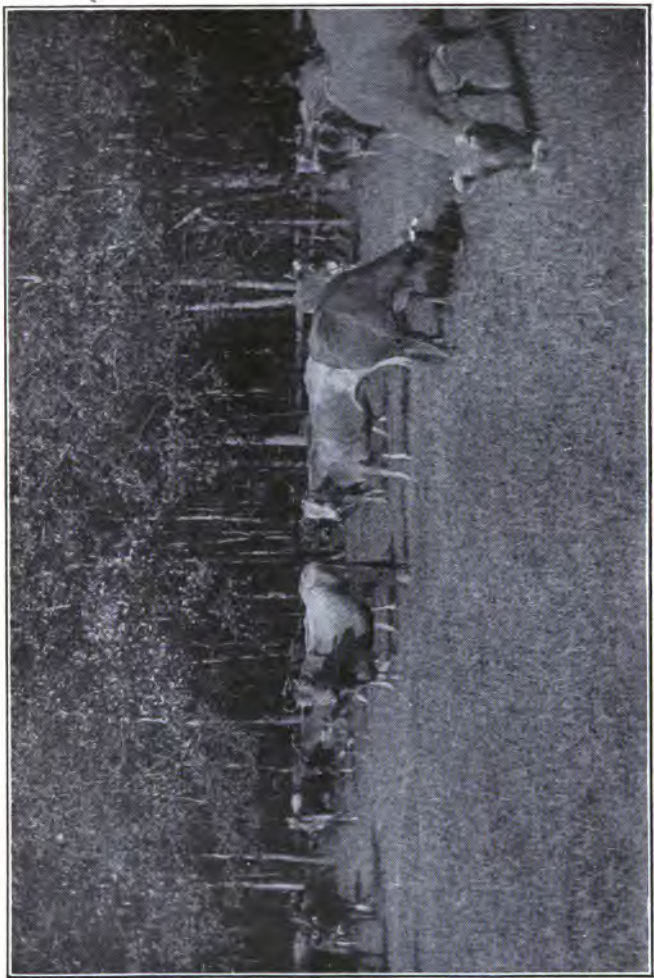
Taking special pains to keep cream sweet, and then troubling to create a medium for turning it, may seem a ridiculous proceeding; but the scientific gentlemen, who are intimately acquainted with the respective families of bacteria which work good and bad effects, have discovered that the natural ripening of cream encourages the develop-

THE EARTH'S BOUNTY

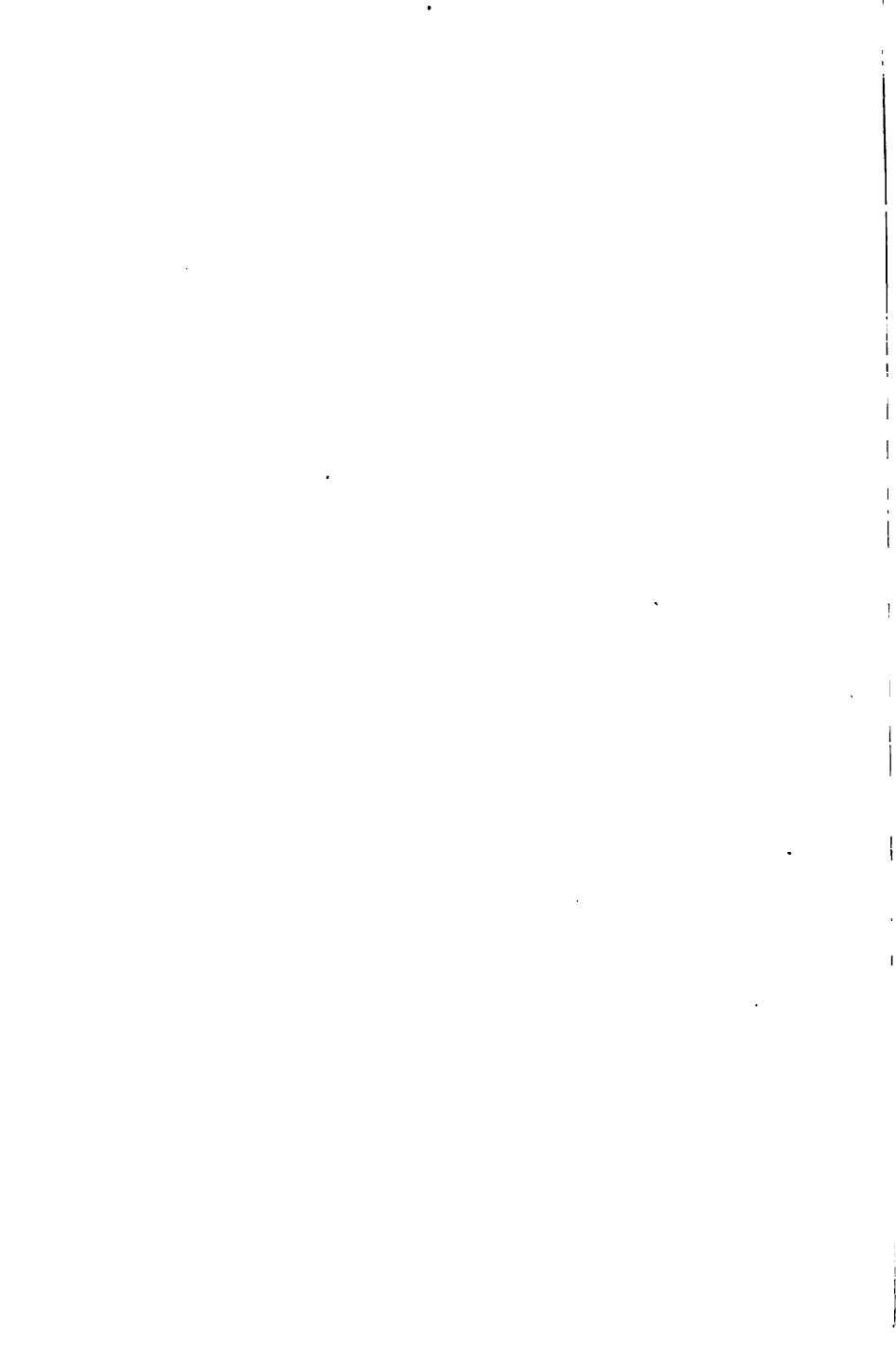
ment of the family which causes putrefaction, gassy fermentations, and other evil changes; whereas the quickly congealed skim milk is only congenial to the desirable family, which, when introduced into fresh cream, create the nutty flavor, which makes the best butter such an appetizing luxury.

We churn three times a week in the summer, and twice in the winter, and use a large-sized barrel churn, which must be rinsed out with cold water in the summer and hot in winter. The cream, also, must be 55 degrees in summer, and 56 degrees in winter, when turned into the churn. A steady revolution of the paddles, at a rapid rate, if maintained for twenty or thirty minutes, is sure to bring butter; but, after a little practice, the sound will convey the exact condition inside the churn without timing or looking.

When the butter is collected into small pieces the size of marbles, run out the buttermilk, and replace it with the same quantity of water, at the same temperature, and in



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which enough salt has been dissolved to make it about 3 degrees stronger than would be desirable in the butter. Turn the handle of the churn for a few minutes, to thoroughly wash off the buttermilk, and collect the butter into larger lumps. Then run off the water, empty the butter out on to the table (a specially made table and roller, to be found in all stores where dairy supplies are sold), roll out the butter, divide through the middle, place one piece over the other, and repeat the rolling, until the water is pressed out and the butter is waxy and firm in appearance.

Never rub butter in making it up, or it will lose its texture and become salvy. Taste during the process of working, and, should it not be salt enough, sprinkle a little dry salt over it, and work enough to distribute evenly. Should it be found too salt, wash it with water of the same temperature. The constant reiteration of the "same temperature" shows how imperative a dairy thermometer is.

THE EARTH'S BOUNTY

For private customers it is better to make up butter in pound prints, which should be placed on a flat board, or dish, and set on ice to harden, and then be wrapped in dairy paper. Keep in a dark, cold place until shipped.

In the summer our butter all goes to a suburban town 12 miles nearer New York City, so Sidney drives over twice a week. In the winter we supply four families in the city, but then there is no trouble about packing it with the eggs, as the boxes we use are made to hold either six or twelve dozen eggs—two dozen in each tray. The removal of one tray makes room for four pounds of butter.

It is impossible to really teach butter making by description. The foregoing hints should enable anyone possessed of gumption to acquire the knowledge, which is only to be collected from actual experience. The small dash churn, and the method appropriate for the family cow, should be the primary course, and is detailed in "A Self-Supporting

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Home," which chronicles our initiation into farm life.

When cleaning milk, cream or butter utensils, wash first in cold water, and scrub with a brush kept specially for the purpose. Use soda or salt, but never soap or wash powders. When thoroughly clean, rinse in scalding water, and depend on draining and airing to dry them instead of using a cloth.

YOUNG CATTLE

A cow should be bred about three months after calving. Bellowing and restlessness are the signs to be observed. The calf is carried nine months, and should be taken from the cow's presence as soon as dropped, for then both are saved the pain of separation, and a calf who cannot distinguish between a real mother and a substitute, will accept hand-feeding without trouble.

The first milk drawn from the cow should be given to the calf, as it contains qualities

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needed to clear the intestines, and regulate the functions of nature. Test the milk when drawn from the cow, and always have the calf's food the same temperature for the first three weeks; after which it can be gradually lowered. With the first four calves we used cloth teats, to teach them to suck, but soon learned that it was almost as difficult to wean them from the rags as it would have been from their mothers, and that they would learn, from the first, just as readily to suck the milk direct from the pail.

For two weeks nothing but skim milk is fed. Then two quarts of wheat bran and one quart of oil meal are boiled in a gallon of water for one hour, strained, and half a cupful is added to the milk at each feeding for several days, after which the quantity is gradually increased, until the feed is about half gruel and half milk, at which time corn meal is introduced into the gruel, a little at a time, until a quart is being used.

Let good, clean hay be within reach after



LUNCH TIME

THE EARTH'S BOUNTY

the third week. Veal calves should have all the milk they want, supplied at least five times a day for the first two weeks; then four times a day. Calves to be retained for beef can at the end of the fourth week be cut down to three meals a day, and, in the summer, gradually deprived of the midday meal, as they should be accustomed to pasture after the third week.

After six weeks of age young cattle want to make growth, more than flesh, to within a short time of marketing, when flesh and fat become the main object. A glance back to the tables of feed materials, in the chapters on manurial values and the silo, will show the constituents of relative materials, and enable anyone to select the best food at their disposal for desired results; remembering, always, that after infancy the frame must be built before it can be covered with flesh, and that the important components of the animal's body are water, which predominates over other substances; ash or mineral matter, which is the

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substance which would be left, as ashes, if the body were burnt, and which no animal can live without, so a small percentage is necessary in food stuffs; protein, a complex group of substances which contain nitrogen, and are represented by lean meat, tendons, ligaments, nerves, skin and brain; fat, which is created from any surplus of digested food, over and above the absolute requirements of the body's maintenance.

It will not do to feed an excess of any one component of the body during the growing age, except in the case of milk cows and laying hens, which require an excess of protein, or, as it is often called, nitrogenous food.

Our system is to turn out to pasture, or feed timothy and pea, or soy bean hay, according to the season of the year at which they cease to be babies, and keep them on fodder or pasture, supplementing in fall off in grass, through drought or change of season, with green fodder or ensilage; for it does not pay to allow young cattle to be checked, and

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growth cannot progress without sufficient food.

Corn, beans and oil meal are amongst the best flesh formers when fattening rations begin.

CHAPTER EIGHT

REARING FAMILY AND WORK HORSES

WHEN my family generously decided to give me a horse as a collective Christmas present, fate, or whatever the odd destiny was which seems to have controlled our doings, ordained that a land agent, who lived on a farm, and kept a fast road horse to take him to and from his office in the suburban town twelve miles away, should die suddenly, his wife decided to move into town, and offered the horse, trap, and complete outfit for sale, at such a reasonable price, that it tempted my folks to the apparent extravagance of buying a real driving horse, instead of the all-round useful animal, suitable to our establishment at that time.

That they had qualms, I am sure; for, in the midst of my delighted raptures, after I found Dolly on Christmas morning (the whole affair

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had been kept a profound secret, and they had smuggled her into the barn the night before), my dear husband said:

"I am awfully glad, Mater, that we could not find a useful horse, for it would not have called forth one-half this amount of pleasure and pride."

Which clearly proved that their judgment had been overruled by the will of our genii.

The significance of the horse being a mare escaped us, until one day early in March, when I drove to the depot quite fast, to catch the mail, and met Mr. E—— there. He came up, patted Dolly, and said casually:

"Rather fast driving, my little lady."

Pride prompted my answer. "Oh, Dolly can do better than that."

"Yes, yes, but I'd slow down from now. It will be safer."

"Why, what do you mean?" I commenced, when Mr. E—— burst out laughing.

"Ah, I caught you, Mrs. Farmer! It's a surprise, isn't it? There should be a pretty

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good youngster long about pasture time, for she was over to our place in October. Thought you didn't know about it, and it's as well you should, so you will start off in time to go over the road quietly. There, don't look so glum about it! You ought to be mighty glad. Just be a little careful. Give her mash about three times a week. Add a little oil meal, and a few carrots now and then won't hurt."

I turned home feeling truly glum. Horse breeding seemed such a masculine sort of business to be plunged into willynilly. Time, and Dolly's serene good health, dispelled some of my nervous trepidation, and I gradually became reconciled to the inevitable, which arrived the first week in May.

Of course all resentment vanished when the little chap was able to plead his own cause. One look from his appealing brown eyes made us all captive; for, as old Reika often asserted, in her odd jargon, "Yune alls was such fond fools bouts baby cattles, as makes yune softy".

Truly, all baby things did appeal irresistibly

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to us women folks, and even the "master man" and Sidney had a predilection for the new arrivals.

"Surprise" really was a darling—so intellectual and gentle. Dolly had been a pet before she came to us, and had lost none of her friendly ways, one of which was trotting down to the house alone in the morning, and whinnying at the dining-room window, until the casement was opened, and she had the slice of bread which was always waiting for her. After a little talking and some cannudaling, she would trot back again to the stables, without even attempting to go on the lawn or escaping on to the road. Mr. Fred said she understood patrol, and was too honorable to break it. From the time Surprise was two days old, he accompanied his mother in the morning, and was allowed to stay around while she was groomed, the little fellow himself having a rub-down and a halter put on every morning.

In fact, he was allowed to be around the

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stables and farm buildings, and treated generally much more like a large dog than a colt. So, as he grew older, instead of scampering away, he trotted up to any person who approached him, quite sure of a pat and some tidbit—all our folks being in the habit of carrying carrots, apples, bread, sugar, or corn in their pockets for the different animals, so many of whom had started life as pets, and never outgrown the habits of youth.

When he was about three months old, Sidney improvised a harness and hitched him to a small, home-made cart, and utilized him to carry around chicken feed to the different houses. By such means he was virtually broken to harness before he was weaned; and from that time on he was used for light tasks, such as carrying in dried leaves, or now and then to give Mr. Fred's baby a ride up and down the drive—of course someone leading him by the bridle, in case any kittenish desire to roll should suddenly possess him. But he usually behaved with the gravity of a senior.



THE ALL-ROUND USEFUL HORSE

THE EARTH'S BOUNTY

Real breaking was quite unnecessary in his case, for he naturally slipped from one thing to another, until he was a fully trained driving horse at three years of age; at which time we sold him for \$200 to a family who still have him, and think he is the best horse in the world.

During the twelve years we had Dolly she gave us six colts, including Surprise, which sold, respectively, at the following prices: Second, when two years old, \$100. Third, two years old, \$180. Fourth, two years and four months old, \$225. Fifth, eighteen months old, \$125. There is a charge of \$45 against each of the first two colts—\$25 service fee, and \$20 feed. The last three colts are only charged with \$20 each, as by that time we had a stallion on the farm.

A clear profit of \$700 from the progeny of an animal who always more than earned her keep, savored so much of finding money, that, when a farm team became necessary two mares were selected. They were just strong, well-

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proportioned animals, but there was a really good percheron stallion within available distance, and our draught colts were even more remunerative than our roadsters.

Three driving mares were bought, as opportunity afforded. The first and last proved good investments, but the second disappointed us once, and the next time gave us much anxiety, and eventually died, leaving a tiny, weak colt, which only weighed forty pounds. Sensible people would have dispatched it with its unfortunate mother, but "us fond fools" fought for the poor little life as if the universe depended upon its survival. It was kept wrapped in a blanket, and fed from a bottle for several days. Then a goat gave birth to a kid which died, and, as a sort of desperate chance, we carried the colt into her stall. She was a quiet old thing, who let us fuss about her, milking a little, and then coaxing the colt to help itself. For some time the task proved hopeless, but Sidney persevered until, eventually, the poor, half-dead mite seemed to comprehend

THE EARTH'S BOUNTY

what was required of her, and made an effort which must have been very satisfactory to its appetite, for there was no more coaxing necessary.

It gained strength at every feed until, at the end of a week, it could stand, even stagger, about the stable. The goat was such a small foster-mother, even for such an undersized colt, that, as it grew stronger, difficulties would have arisen had it not discovered that lying down brought it within comfortable reach of sustenance. Whether she imbibed odd characteristics from her foster mother, or the amount of petting and spoiling she received was answerable, I don't know, but she developed into a regular little elf, skipping and dancing about from morning till night, which made us christen her Zephyrina. Fortunately she was not really vicious. Mr. Fred's children were able to ride her about the farm from the time she was big enough to carry them. But if anything startled her, or, I really believe, amused her, her front feet went up in the air,

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and she waltzed round and round, like a teetotum. The children, who knew no fear, thought it was great fun to cling to her mane through such performances, so no one interrupted at first, and, unfortunately, she had never been accustomed to the small cart, or taught any useful habits, though she could open doors, untie neckties, jump poles, even lie down when told to, and perform lots of such tricks.

When she was about three years of age, Mr. Fred broke her to harness, and the two-wheeled road cart. I commenced using her, hoping that I should be able to break her, gradually, of the rearing habit. One day at the village I had to wait for some things at the store. The old gentleman came out to chat, and commenced to smooth Zephyrina's forelock, a liberty which the young lady resented. Up went her front feet, and she indulged in a lively waltz, whirling the cart round and round, whilst the old gentleman yelled curse words at her, and foolishly tried to get near the back

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of the cart, with some vague idea of dragging me out. When I at last persuaded him to stop, and was able to bring Zephyrina to reason, and her feet to earth, several people had arrived on the scene. The stout old storekeeper, between his puffs and gasps, informed us that the "blasted creature" was "a jack rabbit, and not a horse."

Poor Zephyrina! From that day she was known throughout the neighborhood as the "crazy jack rabbit." Gossip carried accounts of several such performances to the ears of my husband and mother, who became so distressed of Zephyrina's future conduct, and my safety, that she was lent to a young fellow who wanted a saddle horse, and eventually given to him when he was going out West on to his uncle's ranch, from where he occasionally writes, telling of some new proof of the "jack rabbit's" wonderful sense and affection.

But to return to the practical. Every farm must have work horses, and every country home should have a nice driving horse. Both

THE EARTH'S BOUNTY

would answer their specific purpose as well, if mares, and will materially help the general scheme of money-making. For the last ten years the good family horse and the farm horse has been getting more difficult to find, and higher in price; nor is there any likelihood of conditions changing for some years to come. There are usually one or more sires to be found within a radius of ten or fifteen miles, so that the beginner need not undertake the responsibility of keeping a stallion, which is usually the portion of the business dreaded.

We should probably have been contented to send all the mares out to service, had not a fifteen-month-old thoroughbred been put up at a stock farm auction. It was a stormy day, early in the year, and the attendance so meager, that the bidding was a farce. No one made an offer for the colt at first. Then a nasty-looking man said, "Thirty dollars"; and, as it seemed as if he would get it, I said, "Forty," though I hadn't any desire to have the colt, and was rather sorry for the impul-

THE EARTH'S BOUNTY

sive bid, when he was knocked down to me for that ridiculous sum. Three years later he was used at stud, and proved an excellent sire of light driving animals.

Supposing that one is going to start at the bottom of the ladder, as a sensible person will do, with a medium-weight general purpose horse, who can be driven by the family, yet do cultivating and light farm work, select an animal about 16½ hands high, weighing at least 1,000 pounds, with deep chest, a general sturdy appearance, strong legs, well set under the body, large, round hips, and a good, clear stride. Health and good temper are as important as shape in every class of animal, and should be given primary consideration. Such a mare can often be bought, even now, when over twelve years of age, for sixty or seventy dollars; and, if there is a good percheron or Norman stallion in the neighborhood, the colts will be of the strong, draft-horse type, so greatly in demand, and will bring good prices when two or three years old.

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If, however, the first horse is under 16 hands and 1,000 pounds weight, and of a slight build, breed to the best driving, or, as they are often styled, "roadster" type of sire to be found in the neighborhood, the points of which are given by Professor Kennedy as follows:

HEAD.—Ear of medium size and pointed; eye large, prominent, and of docile expression; bones of the nose straight in front, and slightly dished laterally; bones of cranium nicely rounded; nostrils firm, large, and readily dilated; muscles of cheek well developed, but not too heavy; mouth of medium size; lips firm; muzzle fine and tapering; branches of lower jaw well spread apart at their angles.

NECK.—Rangy, with a well-developed crest, and attached to the head in an angular sort of way, rather of obtuse order.

WITHERS.—Should be continuous, with the superior border of the neck well developed and not too broad.

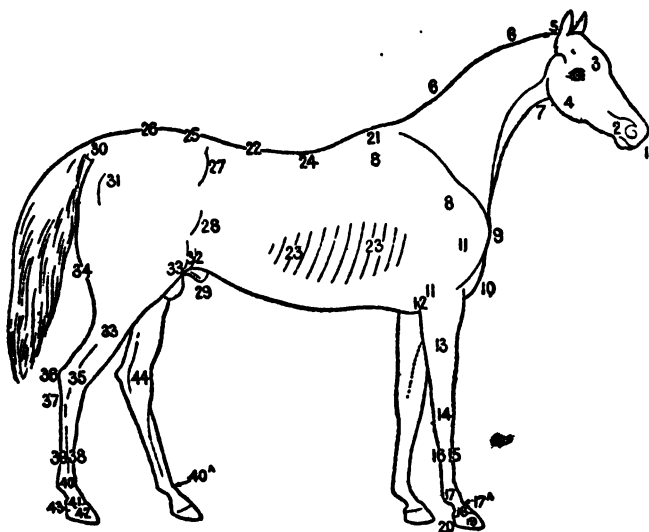
SHOULDERS.—Oblique from above down-



CLEANING OUT THE HOOF

THE EARTH'S BOUNTY

ward and forward, blade well covered with muscles.



Points of the horse: **HEAD**—1, muzzle; 2, nostril; 3, forehead; 4, jaw; 5, poll. **NECK**—6-6, crest; 7, windpipe. **FORE-QUARTER**—8-8, shoulder blade; 9, point of shoulder; 10, breast; 11, arm; 12, elbow; 13, forearm; 14, knee; 15, cannon bone; 16, tendon; 17, fetlock; 17A, pastern; 18, coronet; 19, hoof; 20, heel. **BODY**—21, withers; 22, back; 23, ribs; 24, girth; 25, loins; 26, croup; 27, hip; 28 flank; 29, sheath; 30, root of tail. **THE HIND-QUARTER**—31, hip joint; 32, stifle joint; 33-33, gaskin; 34, quarters; 35, hock; 36, point of hock; 37, location of curb; 38, cannon bone; 39, back sinew; 40, fetlock joint; 40A, pastern; 41, coronet; 42, hoof; 43, heel; 44, location of spavin.

THE EARTH'S BOUNTY

CHEST.—Very deep through the girth; breast good depth and well filled.

ARM.—Strong, and well set in.

ELBOW.—Well muscled, and lying close to the chest.

FOREARM.—Well developed and strong, with muscles well defined and standing boldly out.

KNEE.—Straight and strong in all directions, free from malformations.

KNEE TO FETLOCK.—Cannon bone rather short, broad, flat, and clean; tendons well defined and prominent, not tied-in beneath the knee, and free from beefiness.

FETLOCKS.—Fetlock joint wide and well defined.

FRONT PASTERNS.—Strong, of medium length and obliquity.

FRONT FEET.—Of medium size, rather round, with strong wall; sole rather concave; frog large and well developed; heels broad, strong and not too deep, toes turning neither in nor out.

THE EARTH'S BOUNTY

BODY.—Back straight and rather short; loin broad and well muscled; ribs of good depth, with well-marked angles.

CROUP.—Broad, well muscled, and out straight to tail, which should be full haired and well carried.

HAUNCH.—Muscles well developed, deep through ham; quarters broad and strong.

STIFLE.—Strong, well muscled, and compact.

GASKIN.—Muscles prominent and hard.

HOCK.—Large and strong in all directions; all parts well developed; free from malformations and puffiness; posterior border straight.

HOCK TO FETLOCK.—Cannon bone rather short, broader and flatter than in front; tendons clean and standing out prominently.

FETLOCK JOINT.—Large and strong.

HIND PASTER.—Strong, of medium length and obliquity.

HIND FEET.—Smaller, and not so round as in front; sole more concave; frog well developed; heels strong, and not too deep.

THE EARTH'S BOUNTY

COLOR.—Bay, brown, black, chestnut, roan, and gray, with reasonable modifications.

SKIN AND HAIR.—Soft, mellow, loose skin; fine, sleek coat of hair.

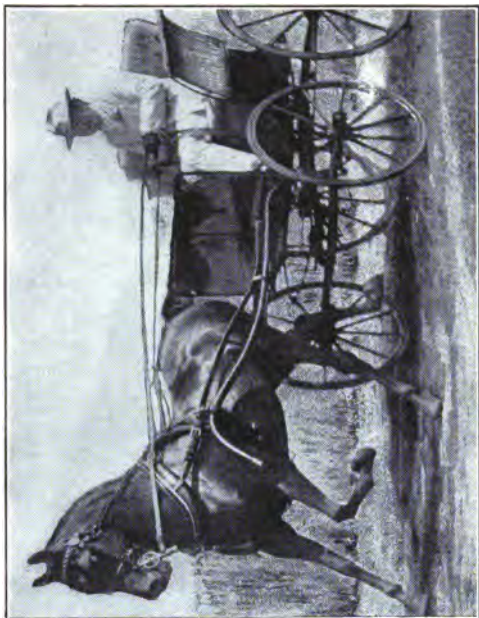
TEMPERAMENT.—Docile, kind, prompt, energetic, and not too nervous.

STYLE AND ACTION.—Free and elastic; perfect in trotting gait; a good walker; must not paddle or roll in front; may go wide behind; may either trot or pace; must go level, without hitting any part, and be able to go fast.

WEIGHT.—One thousand pounds and upward.

HEIGHT.—Fifteen to 16½ hands.

The above description will apply to the mare and gelding of this class, except that they will not be so masculine in appearance. The neck should be more delicate and clearer cut, the crest not so well developed, the withers more pronounced, not so thick through, and through at the upper part, and there should be a slight line of demarcation between the withers and the neck.



GOOD TYPES FOR RIDING AND DRIVING

THE EARTH'S BOUNTY

It may not be possible, of course, to get the ideal, but it is as well to know what to try for. A percheron sire should be 16 or 17 hands high, and weigh from 1,500 to 2,200 pounds, with broad, intelligent head, small ears, short neck, strong, well-formed body, low and blocky, short legs, and large, round hoofs. They are quiet, stolid creatures, naturally, and the colts are much easier for an amateur to raise and break than the more high-spirited class of driving horse.

STABLING AND GENERAL CARE

Stables should be light and well ventilated, free from damp and drafts. The single horse can either have a box stall, in which it can be free to move around at will, or the ordinary narrow stall, in which it is controlled by a tether, which should be arranged to work on a pulley and weight, to prevent it getting entangled in the horse's legs, and causing an accident when lying down or getting up.

THE EARTH'S BOUNTY.

Grooming is of the utmost importance, not only for appearance, but health, for it opens the pores of the skin, promotes circulation, and aids digestion. Have a light chain or rope, with a snap at one end, firmly fastened to each side of the barn doorway, and just long enough to reach within a foot of the center. Then, when the horse has eaten its breakfast, lead it out to the doorway, and attach the snaps, at the ends of the chains, to the rings in the bridle, at each side of its head.

If the weather is cold do not strip off the stable blanket all at once. Just undo the front, turn it back over the haunches, curry neck and fore quarters, follow with a stiff corn brush, replace the blanket, turn up the back part over the shoulders, to be out of the way whilst the hind quarters are curried and scrubbed with the corn brush, by which time the horse's blood should be circulating so well that the blanket can be entirely removed, to permit polishing with the hair brush, which must be accomplished by a brisk, circular

THE EARTH'S BOUNTY

movement, going all over the animal's body, from head to tail. Finish with a clean, coarse cloth, and reblanket at once. The currycomb should never be used on the legs or the face. For the former use a coarse corn brush first; finish with a hair brush and cloth. For the face use a sponge rung out of water, round eyes and mouth; polish with a dry cloth.

The horse should also be brushed after using, before being placed in the stable. The tail and mane should be washed in warm water and castile soap once a week, and well brushed every day. Stray hairs in the mane must be pulled out with a sharp twitch. The tail can be trimmed with scissors.

Good feet are more than half a horse's value, therefore must not be neglected. A horse only traveling a few miles a day will need shoeing about once every six weeks, and probably the shoes resetting once every three weeks. The feet and legs must be washed off every day, at the morning grooming, and any foreign substances that may

THE EARTH'S BOUNTY

have lodged round the edge of the shoes removed very gently, with a pointed piece of steel or iron. The sole, or inside, of a horse's hoof is very tender and easily injured, so do not allow any rough or inexperienced stable boy to poke about indiscreetly with a sharp-pointed weapon, but rather depend on washing only. During long periods of dry weather, it is beneficial to pack a horse's front feet in linseed meal once a week. Make a poultice of the meal and hot water, hold up the horse's hoof, and fill to the edge of the shoe; then bind in place with a strong cloth or burlap, allowing it to remain several hours, and washing off in warm water.

The hair on the fetlock should be trimmed neatly, but for the country I do not believe in cutting too close, for the hair is a protection against "scratches." The horse which is regularly clipped is usually the most healthy, because the skin can be kept in good condition, an impossibility if the body is covered with long hair.

THE EARTH'S BOUNTY

It is also advisable to have the mouth examined by a thoroughly experienced person every few months, as the molars have a tendency to roughen on the outer edge, and interfere with mastication.

FEEDING

Feeding even the one useful horse must necessarily be influenced by the class to which it belongs, and the amount of work it is called upon to do. The light-weight road horse, traveling only a few miles a day, will keep in good condition on ten pounds of hay and nine quarts of oats a day; but the same horse, doing sixteen or twenty miles a day, would require fifteen pounds of hay a day and twelve quarts of oats. A heavy horse, doing light work, would require about the same amount of oats, but more hay, and, when doing hard farm work, about sixteen quarts of oats, so that circumstances and common sense must regulate exact quantities.

THE EARTH'S BOUNTY

In winter we deduct one-third of the oats at night and replace with corn. Saturday night is mash. If a horse is having four quarts of oats, it gets the same of mash, composed of two quarts of ground feed (corn and oats ground together), two quarts of bran, half a pint of linseed meal, all mixed, and moistened with boiling water early in the afternoon, closely covered, and fed just warm.

Soy bean and Canada pea hay are fed as a third of the hay ration three times a week. In the summer bran alone is used for the mash, and some freshly cut grass is fed every night. The work horses are allowed half an hour's loafing time in the paddock, when unharnessed at night, to roll, and generally relax, before being brushed off, legs and face washed, and turned in to supper.

How and when to water horses is a subject of much dispute. Some say twenty minutes before eating, some twenty after. And the quantity is as widely questioned. Our stables have stationary drinking troughs, which are

THE EARTH'S BOUNTY

always full, so the animals suit their individual tastes; and, in hot weather, if they are doing heavy work in parts of the farm where there is no running water, a barrel on wheels is taken with them, and stationed where the horses will pass often during the day. When heavy work is to be performed on record-breaking days, in July or August, plenty of drinking water, and a big, soaking sponge, passed over head and throat, ward off ill effects from the heat.

Of course, if a horse comes in overheated from driving or working, it would be dangerous to allow it to drink quantities of cold water; but sponging its face and fetlocks relieves the parching thirst of fatigue almost instantly. I know, by bathing my wrists under similar circumstances. Then, by the time the horse has been brushed and turned into its stall, it will be cool, and the consuming desire for drink so moderated that no restriction need be put upon its helping itself to all it wants.

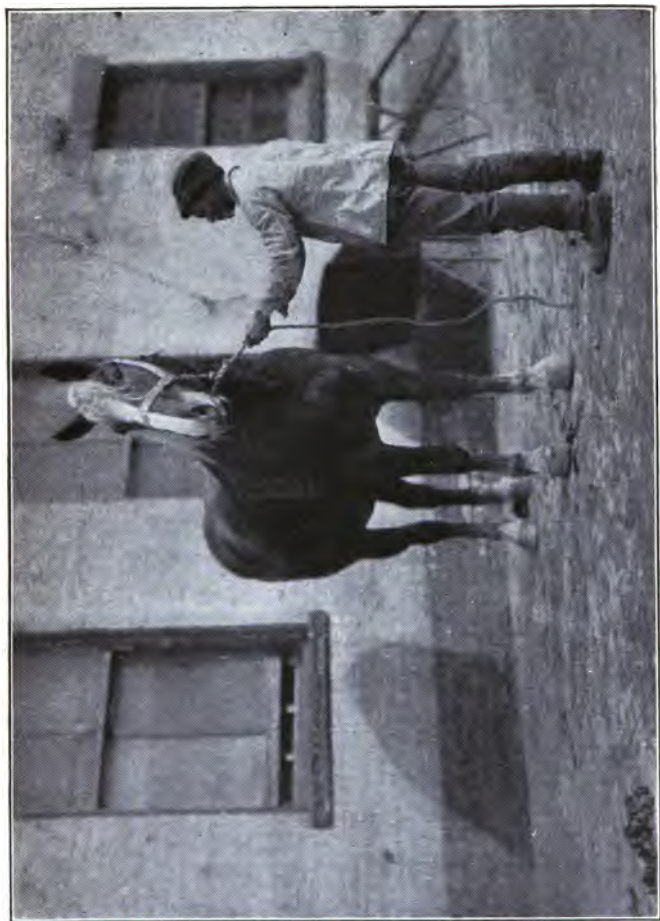
THE EARTH'S BOUNTY,

THE BROOD MARE

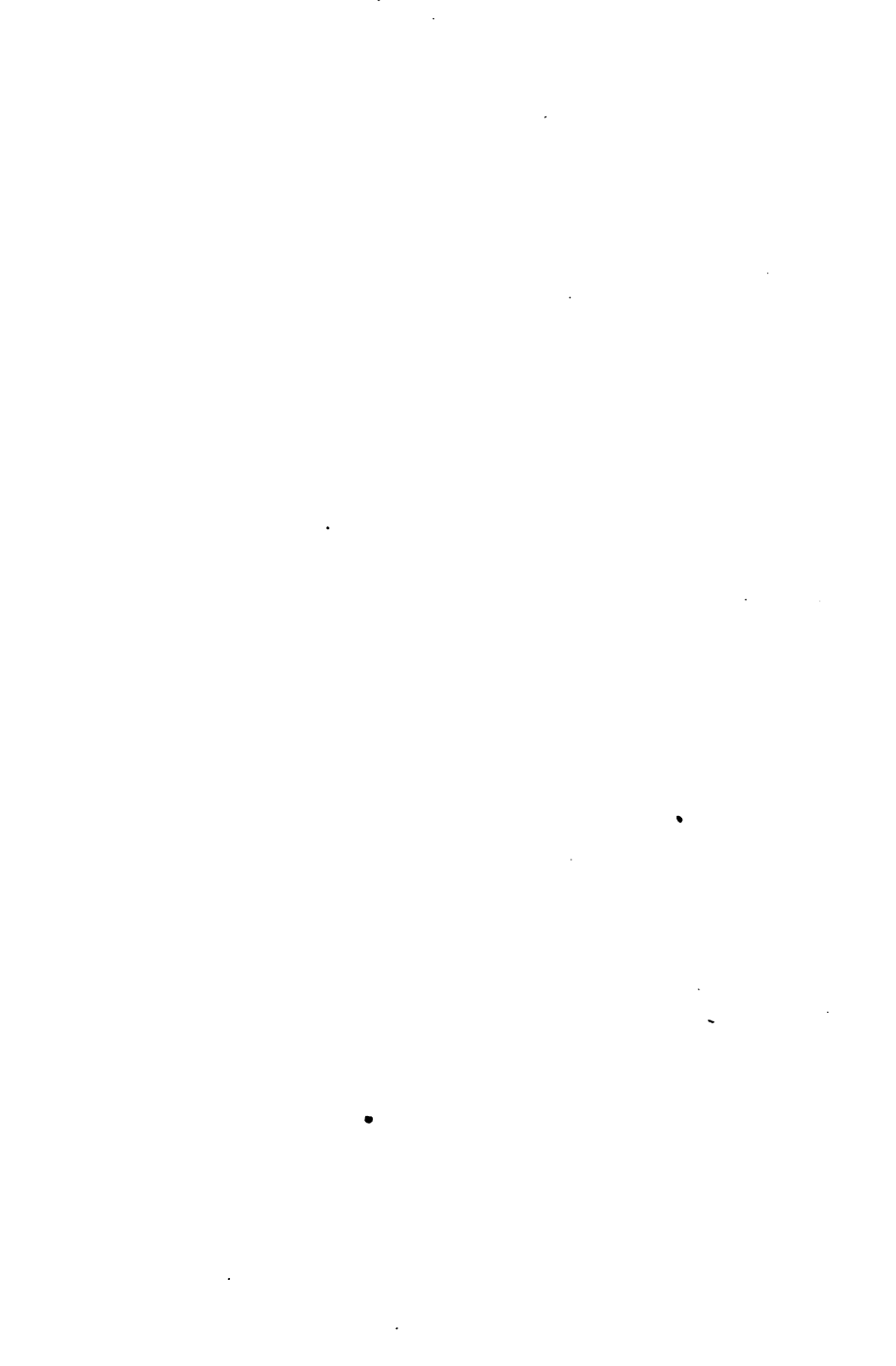
The mares are worked until about a week of foaling time, but during the last three months their tasks are of lighter descriptions. Exercise of a description to which the mare is accustomed, if not too heavy, is beneficial; but if she is used to hauling loads round the farm, don't think that driving her to the village and back will be easier and therefore preferable; for the unaccustomed work will, in all probability, worry and tire her much more than doing her ordinary duties.

Rations are about the same, except that bran and linseed meal mash should constitute the night feed, twice a week, during the seventh, eighth, and ninth months; and three times a week for the following two months, when chopped carrots should also furnish a small part of the diet, say, from one to three quarts a day.

A mare carries her foal eleven months, or, to be more exact, 330 days. Except with a



THE PERCHERON TYPE



THE EARTH'S BOUNTY

young mare, or in the rare case of accident, it is not necessary to be anxious about the occurrence. Give her a box stall, with plenty of bedding. When it comes to within a few days of the time, the man in charge of the stables should make a visit of inspection late in the evening, and, if necessary, remain up all night, as it is well for some one to be on watch; but one accustomed to horses, or, indeed, any animals, can easily detect any unusual or alarming symptoms, in which case, unless there is a good horseman on the farm, it would be safer to send for a veterinarian or some experienced person.

Quite frequently foals need teaching to come to their mothers, and occasionally the mother has to be coaxed into allowing its approach.

Continue the bran and meal mash and carrots for two or three days, then gradually go back to the ordinary rations.

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THE COLT'S FEED AND EDUCATION

The mother and baby are left together for a week or nine days. Then the mare is put back to work, the foal being stabled with her at night, and allowed an hour with her at noon-time for the first three months. At least that is the prearranged plan, but, honestly, I think the little ones are rarely kept strictly to the rule, because they are so frequently about with the mothers that there is every opportunity for little meals to be stolen without us humans raising any objection.

When foals are about two months old, a pan of finely ground oats and bran, mixed in equal parts, with a little salt added, is kept on a high shelf in the stable, and when Mr. Fred or Sidney are around, feeding, they put a little in their hands, and let the foal lick it off, which it is usually quite ready to do, being attracted by the salt. When it has acquired a taste and appetite for the grain, a small pan with, perhaps, half a teacupful of the mixture is held

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out to it night and morning, the quantity being increased until, at four months old, it is taking about two quarts, night and morning. Some of the best timothy, bean, or pea hay is chopped fine, and kept within reach of the foal from the first month.

One of the road mares never had much milk, and her foals had always to be taught to drink from a pail, in the same manner as the calves, fresh cow's milk being used at first, then skim milk, mixed with oat gruel. The want of mother's milk never made any perceptible difference, as the foals seemed just as healthy, developed just as well and quickly, as the babies who had good mothers. By six months of age the foals are entirely weaned, and have a stall of their own, as becomes the dignity of a half-grown colt; but they are never segregated, or turned out to rough it, and become wild. In bad weather they have a covered yard to play and exercise in. Fine days, the gate into the stable paddock is opened for them to go in and out at will.

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Racks of mixed hay and water are accessible in the yard. Night and morning they have oats and bran, with a little corn and oil meal added alternately, once or twice a week. During January and February the night meal consists of mash, made of boiled turnips, ground feed, and bran. There is always rock-salt in the yard, but still, about a handful is mixed with all mash fed, to insure their getting sufficient for health. From the following spring they are allowed free pasture range, virtually gathering their own feed, except that, to keep them tame and friendly, they are called up at night, given a few oats, and stabled.

The second winter they again have the mixed hay, which includes timothy, bean, pea, or clover, the three latter being especially good for building bone and sinew.

TRAINING

With the exception of Zephyrina, we have never had any obstreperous colts; which, I



TRYING TO PHOTOGRAPH A COLT



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think, is due solely to the manner of bringing up. From birth they are petted and caressed, always wearing a halter, and being accustomed to having a hand run down their legs, and the feet looked at, every day, not with the idea of discovering disease or traces of gold, but simply as a part of the curriculum. During winter, when the men have time, they are groomed each day; and after six months of age they are hitched to a small cart, or an equally small cutter, and used round the place. Of course no weight is put upon them, and it is done as much for the two boys' amusement as any idea of discipline, Mr. Fred makes one stipulation, which he insists upon being observed, which is that under no circumstances must a colt be allowed to walk slowly, for this is a habit, once acquired, it is very difficult to break, and a slow walk is a detriment to a horse of any class.

When colts are able to trot two miles they are tied behind a rig, when eggs are taken down to the railway station of a morning.

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The express passes through ten minutes before the slow train we ship on is due, so the babies get accustomed to the rush and noise of a locomotive after a few trips. At first Sidney hitches up, gets down, and holds the foal by the halter, stroking and talking to it. Generally its mother is the horse between the shafts, which also gives it confidence. The pasture used for the colts in summer is near the cut in the woods, where the railway passes through, so familiarity breeds the usual contempt, and steam-engines have no terrors for our young horses.

It may seem a lot of trouble to train colts from babyhood, instead of leaving them wild until two and a half or three years old, and it probably would be impossible if the business was being conducted on a large scale; but with only a few brood mares, and a liking for animals, it is a pleasure that saves trouble, risk, and much cruelty to sensitive, nervous creatures. Think how terrifying it must be to a young horse of two or three years old,

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who has never been handled or restrained in any way, to be suddenly corraled and broken to harness. Notice the number of horses who cannot be safely driven up to a moving train, and you must be convinced how difficult the habits of youth are to be overcome. There is a solidity about baby creatures which makes them accept things that would strike terror to the soul of older animals, with comparative indifference. If, for any reason, colts have to be neglected until their second or third year, or in the case of buying, as we did our stallion "Mogul," the first thing is to get on friendly terms.

We turned "Mogul" into the small paddock, as the grass was scant at the time we bought him, and coaxed him to us with a pan of oats and salt. At first he resented any attempt to pet or caress him, but, after a few days, he accepted such attentions with an air of resignation, which gradually gave place to pleasure and appreciation, that grew until he took the initiative, on seeing any of us at the

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gate, and trotted up with a whinny of welcome, and stretched his head over the bars to be caressed. After a time we used to slip a halter on his head and lead him into the yard, for breakfast and supper; so, when Mr. Fred had time to really take him in hand, he was nearly as gentle as one of our own rearing, and my most devoted servant, as he always remained.

Many, nay, most people, have an idea that a stallion is a dangerous animal, unsafe for general use. The Mogul was spirited, of course, but as gentle and good-tempered as a lamb. I have driven him everywhere, even to stock farms and auctions, where there were all sorts of strange horses, and he never became unruly. He could be trusted to go down from the stable, after he was saddled, to my call, and would follow me anywhere, even in the woods, where branches had to be dodged and brush pushed through.

CHAPTER NINE

QUAIL AND WILD DUCK

QUAIL as pets, or for market, are most satisfactory birds. I was only about nine years old when a friend of my father's brought me two little ones. At first they were very shy, and would not feed, so a mash of corn meal, well cooked, mixed with hemp seed, and moistened with raw egg, was pushed down their throats with the aid of a small stick about every two hours. After a week they commenced to pick from my fingers, and nestle into my hands, as contentedly as if it were their nest.

One poor little fellow was accidentally killed, but the other, Bobby, lived, grew, and became one of my army of pets, sleeping in a small dog kennel in the front garden, and trotting

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about with the cats and dogs, much more like a four-footed beastie than a wild bird. His friendliness grew until the following spring, when he suddenly disappeared, to reappear some weeks after with ten little ones and a mate. Naturally we were all delighted, though Bobby never succeeded in convincing his family that house-dwellers were safe creatures. They would hover about when he came to ask for food, and when we retired, after scattering wheat or cracked corn over the garden path, they would cautiously respond to his call, congregate about the food, and enjoy a goodly meal.

From that year there were always some quail, in a half-wild state, feeding about the barn buildings during the winter. As nearly as I can remember, it was two years later that Bobby was found near the side porch with one leg and one wing broken, and with an injured bill. Of course he was taken in and doctored, having to be fed with almost liquid food, through a quill, for many days. At last he

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managed to hop about and pick up food, but always remained a cripple, and never evinced the slightest desire to wander beyond the immediate vicinity of the house.

This juvenile friendship with Bobby is my authority for recommending quail as pets. Their commercial value was first tested seven years ago, when five pairs of Bobwhites were procured, from which we raised fifty-two the first summer. Fifteen pairs were sold, for propagating purposes, at a dollar a pair. Six pairs were kept to increase our own stock. Thirteen birds were used on the table, and would have decided any doubt about quail being an acquisition to the home, even if they had not shown such a good cash return.

Game birds of all sorts have become so alarmingly scarce throughout the country during the last fifty years, that organized societies for their preservation and propagation are being formed in every State. In 1903 it was estimated by the Biological Surveying Bureau that 200,000 quail were required by such so-

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cieties, and that the demand would be larger each season, as the work increased.

Catching wild birds in remote districts where they are still plentiful, for restocking preserves, has not proved successful, because the fright, close confinement, and unaccustomed food, all of which are unavoidable during the period of shipment, debilitate the birds so seriously that the majority die off when liberated amid strange surroundings, before discovering the feeding and sheltering possibilities of their new environment; so the demand for live birds will have to be met by semi-domesticated stock.

Many of our neighbors, and probably farmers in other districts, deprecate the idea of restocking the country with quail, declaring that they are as destructive in corn fields as crows, which is a great mistake, according to Sylvester D. Judd, ornithologist, who has published the following report:

The Bobwhite is preëminently a seed eater. Of its food for the year, as a whole, seeds

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form 50.78 per cent., and include those of many different plants.

The bulk of this seed diet consists of the seeds of weeds. Fully sixty different weeds are represented in the food, and constitute more than a third of the food for the year as a whole. Some idea of the value of the bird as a weed destroyer may be gained from the number of seeds taken at a meal. Thirty buttonweed seeds, 200 to 300 smartweed seeds, often 500 of sheep sorrel, and 700 of three-sided mercury have been taken at one feeding. One bird, taken November 6, 1902, had eaten a thousand ragweed akenes; another, killed the previous November, had eaten an equal number of the seeds of crabgrass, a troublesome weed in truck land. Birds have been shot in Mecklenburg County, Va., whose stomachs contained 3,000 leguminous seeds, mostly of the tick trefoil and various species of bush clover. Pigeon grass, which is extremely common and mischievous in truck land, is a favorite food. No less than 5,000 seeds of this

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troublesome plant were found in the stomach of a bird shot in October, 1902, at Pinebrook, N. J. Finally, a Bobwhite taken on Christmas Day, 1901, at Kinsvale, Va., was discovered to have eaten 10,000 seeds of that abundant and obnoxious pest of the garden, the pigweed.

A careful computation of the total amount of weed seed the Bobwhite is capable of destroying is surprising in the magnitude of its result. In the State of Virginia it is safe to assume that, from September 1 to April 30, the season when the largest proportion of weed seed is consumed by birds, there are four Bobwhites to the square mile, or 169,800 in the entire State. The crop of each of these birds will hold half an ounce of seed, and as at each of the two daily meals weed seed constitutes at least half the contents of the crop, or a quarter of an ounce, a half ounce daily is certainly consumed by each bird. On this very conservative basis the total consumption of weed seed by Bobwhites, from September

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1 to April 30, in Virginia, amounts to 570 tons.

The Bobwhite is insectivorous, as well as granivorous. Insects are eaten during every month of the year, and amount to 14.93 per cent. of the food for the year as a whole. Furthermore, the proportion of injurious insects habitually eaten by the Bobwhite makes its services as a destroyer of insects more valuable than those of many birds whose percentage of insect food, though greater, includes a smaller proportion of injurious species.

Conspicuous among the pests which the Bobwhite destroys are the potato beetle, the twelve-spotted cucumber beetle, the bean-leaf beetle, the squash ladybird, wireworms and their beetles, May beetles, such weevils as the corn-bill bug, the imbricated snout beetle, the clover-leaf weevil, and the Mexican cotton boll-weevil, the striped garden carterpillar, the army worm, the cotton worm, the boll worm, various species of cutworms, the corn-

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house ant, the red-legged grasshopper, the Rocky Mountain locust, and the cinch bug. Some of these pests are relished, for a dozen army worms or cutworms are frequently eaten at a meal. Thirty Rocky Mountain locusts have been found in a single crop. Weevils are greatly sought after, 47 cotton boll-weevils having been eaten in a morning by one Bob-white. Striped cucumber beetles are destroyed by the score, potato beetles by the hundred, and cinch bugs by the tablespoonful.

From May to August, inclusive, beetles form 17.9 per cent. of the food of the Bob-white; bugs, 6.3 per cent.; caterpillars, 2.4 per cent.; grasshoppers, 2.3 per cent.; miscellaneous insects, 0.8 per cent., and spiders and other invertebrates, 1.9 per cent.

The losses caused by some of these pests show how desirable it is to protect a wild bird that habitually destroys them. The Mexican cotton boll-weevil damages the cotton crop to the extent of \$15,000,000 a year, the potato beetle lops off \$10,000,000 from the value of

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the potato crop, and the cotton worm has been known to cause, in a year, a loss of \$30,000,000. The cinch bug and the Rocky Mountain locust, scourges that leave desolation in their path, have each caused, in certain years, a loss of \$100,000,000.

By far the greatest insect destruction, by the Bobwhite, occurs during the breeding season. Not only does a third of the food of the adult bird then consist of insects, as has been stated, but their growing broods consume insects in enormous quantities. The food of the young of practically all land birds contains a much greater percentage of insects than that of the mature birds; and the amount of food the young require is immense, in proportion to their size.

In order to learn how far the bird might injure ripening wheat, observations were made, for several years, at Marshall Hall, Md. During November immense flocks of crow blackbirds made such havoc in winter wheat, that diligent use of the shotgun was necessary

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to save the crop. But no Bobwhites were ever seen in the act of taking grain. A hen bird, shot June 18, 1903, in a field of ripe wheat, however, had much grain in its crop, though whether it obtained the food from standing stalks or from kernels dropped on the ground was not known. As the Bobwhite usually feeds on the ground, the latter source appears the more probable. Farmers whom the writer has consulted, who were well aware that goldfinches feed on ripening oats, and that red-winged blackbirds ruin whole fields of sweet corn, say that the Bobwhite does no harm to standing wheat or other standing grain.

The bird is, however, a notorious stubble feeder. Where fields of wheat stubble support a rank growth of ragweed, as in some of the Eastern States, the sportsman is most likely to find a covey feeding. On the Western plains no ragweed grows amid wheat stubble; therefore the birds are more often found in cornfields, where the stalks have been left standing, after the removal of the ears.

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In such a place, at Badger, Neb., six Bobwhites were shot in November, 1901, whose corn-distended crops contained, in all, 181 kernels. Birds that feed in wheat stubble often take from 100 to 200 grains of wheat at a meal. A Bobwhite was taken in December, 1902, at West Appomattox, Va., whose crop contained 508 grains of wheat, and was distended almost to bursting. This habit of gleanng waste grain, after harvest, is beneficial to the farm, as the germination of volunteer grain is not desirable, especially where certain insect pests, or parasitic fungi, are to be combated. As the scattered kernels are often too far afield for domestic poultry to gather, the Bobwhite's services in this respect are especially useful.

Being such splendid aids to agriculture, I think that every owner of land should consider it a moral duty to keep a few pairs in captivity, and turn their progeny loose each season, and to construct a few shelters, in remote parts of the farm, to save their being

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snowed under, and starved to death, during severe winter weather, as dozens do every year, through their habit of lying on the ground under brush, instead of roosting, like the majority of birds. It would not take much time or trouble just to make a sort of hurdle, five or six feet square, of saplings and cedar boughs, with one end raised a foot above the ground, on logs. Then, when the natural supply of food commences to be scarce, scattering a little grain under the shelters, for a few times, will attract the birds to the refuges.

Even semi-invalids, or bachelor girls, who contemplate spending a summer *à la* Robinson Crusoe, would find the care of one or two pairs of quail an appropriate occupation. After nesting time, when they are quite tame, and allowed entire freedom, their presence will attract the real wild creatures of the vicinity to venture within close range, and afford opportunity for many friendships with the furry and feathered neighbors.

As fall approaches, and the supper fire is



MR. AND MRS. BOB-WHITE AND FAMILY AT HOME

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raked into a crackling glow for the evening, the long, mellow note of the Bobwhite, which summons wanderers from the cover, home to the chosen night shelter, sounds a personal note which prevents the mysterious murmur of the woods becoming uncanny to the amateur hermit. Another advantage of such companions for a wilderness sojourn is that, when holiday time ends, and camp has to be broken, they can be left to fend for themselves without any cruelty.

MANAGEMENT AND CARE

There are five varieties of quail common in different parts of this country: Mexican crested, which lay from nine to sixteen eggs; California partridge (quail), from eight to twenty-four eggs; and the Bobwhite, which is the variety most generally used for market purposes, and lays an average of fifteen eggs to a clutch, sometimes nesting twice in a season.

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Our original inclosure was 70×50 feet, a trench 9 inches deep being dug all around, to insert a foot-board, which formed the base. Wire of half-inch mesh, 2 feet deep, was followed by two-inch mesh, 4 feet deep, making the "walls" 6 feet 6 inches high. The land was partly covered with brush, which afforded the shade and secrecy positively necessary to successful breeding. The cleared spots were dug up for dusting baths. In the center a shelter, 6 feet square, was erected, consisting of rough boards, nailed together on scantling. Logs, 3 feet long, and about 15 inches in circumference, were used, one at each corner, as supports. The two back legs were inserted a foot and a half in the ground; the front ones only a foot, so making a slant to the roof that would shed rain. The back was boarded up tight, sides and front being left open, except for the shelter afforded by brush, which was piled up all around, to prevent the snow from beating in on the birds.

The original five pairs were shipped to us

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from the Southern Michigan Game Association, and, being a long time on the route, looked such sorry little creatures when they arrived, that, instead of turning them out into the proper inclosure, a pen used for breeding pheasants, 9 feet long, 3 feet wide, with a coop at one end, was utilized for their accommodation, so that we could observe any dangerous symptoms. Fortunately no actual disease did develop, but without the dieting and cosseting they received I doubt if many would have survived; for they had contracted colds, and had been roughly thrown about in shipment, one bird having an injured eye, and the other a strained wing, casualties which were not perceptible in the close quarters of the crate, and which necessitated catching the sufferers and confining them in separate cages for treatment.

The other eight received the following doctoring: One tablespoonful of kerosene oil added to every quart of drinking water as a specific against roup, canker, and other

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troubles likely to develop from a cold. A mash composed of scalded liver, and garlic chopped very fine, steamed bran, and corn meal, all mixed, and fed at a crumbly consistency, was the morning meal for about two weeks. At noon, ragweed and pigweed, or shumac heads served for lunch. Supper was whole wheat.

In about three weeks the birds had quite recovered, and were turned into the inclosure. Then mash was only fed three times a week, for another two weeks; then twice a week, for two weeks; after which, it was stopped altogether, the regular winter rations being cracked corn, wheat, kafir corn, or any of the similar grains, night and morning; seed-heads of weeds and shumach being gathered and given to them once or twice a week, just when it was convenient to gather them. Occasionally a little green bone, or chopped lights, were given, as they were always on hand throughout the winter for the poultry; but when such is not the case, quail will do just as well with-



RUFFED GROUSE OR PARTRIDGE

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out animal food, until the middle of February, when meat or ground fresh bone *must* form part of their diet if eggs are to be plentiful and the little ones strong.

By the middle of March boxes a foot square, with front and one side knocked out, were secreted under brush, in different parts of the inclosure, with the hope that the birds would find and nest in them later in the season. The reason for knocking out the side of the box is to allow the bird to nest on the earth, which they seem to prefer. I've been asked, "Why put boxes at all?" and, as the question may occur to the reader, it will be answered. Boxes protect the sitting birds from four-footed enemies that might creep up from the rear and attack her or steal the eggs.

The first year the birds were allowed to nest and rear their own broods. Subsequently some of the eggs from each nest were stolen, and set under bantam hens. As with most game and water birds, this is the best plan, as the domestic hen of any size is more amena-

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ble to control, and the babies can be given better care; moreover, depleting the nest cheats the birds into laying more eggs, before desiring to set. Our rule is not to take any eggs until the nest contains three. After that each extra one is purloined, up to the thirteenth, which gives us ten from each bird as a rule. But birds vary; some will commence to set even on three eggs, though it doesn't happen often. It is not safe to be seen interfering with the nests, so the thief should make the raid whilst the birds are being given their evening meal.

Always feed at the same place in the inclosure, use the same call, or whistle, and they will soon become as tame and responsive as poultry. The eggs are laid, pointed end downward, in a tray of bran, and turned every day until set.

We use boxes 3 feet long, 3 feet wide, and 15 inches deep, with a lid made of wire netting, in which to set hens in charge of game eggs—nest-boxes a foot square, carpeted with

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a thick sod, being placed in one corner. The floor of the large box is covered with ashes, and pans for water and feed are fastened to one side, so that Biddy can take a meal if she feels so inclined. The reason for the large box is threefold. First, it prevents rats getting to the eggs; second, Biddy from straying to any other nest, or any other hen trying to take her nest; and, lastly, it is a safe playground for the babies, if they should escape from the nest during the first forty-six hours; for such tiny mites can easily get lost.

Before setting the hen she is held by the feet, head downwards, and, through the agency of a flour dredger, filled with insect specific, thoroughly powdered; and twice again, during the term of sitting, she is taken from the nest, after dark, and dredged. If such precautions are not taken, the bird will be so annoyed that she will constantly leave the nest to relieve the irritation, by dusting in the ashes or sand, with which the floor of the coop is covered. These pests of fowls and bird families are so fero-

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cious and prolific that even a few on a sitting hen will, if neglected, multiply into an army by the time the chicks are out of the eggs; and then the little ones are infested with the horrid things, which rob them of health, frequently becoming the unsuspected cause of apparently mysterious disease and death.

If the weather is very dry and hot during the time of incubation, the sod is sprinkled with water, once a week, whilst the hen is off feeding. When the term of incubation is almost completed, two guinea fowl eggs are boiled hard and slipped into the nest, to keep Biddy still for a few extra hours, after the quail eggs are hatched, which insures the babies being thoroughly dry before leaving the nest, and gives them strength before exercising or eating.

The birds require no food for thirty-six hours after hatching, because the yolk is absorbed before the shell breaks, and must be assimilated before other food is taken, or the digestive organs are overtaxed. Ignorance

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of this fact, amongst amateur poultry keepers, is the principal cause of failure with incubator chicks.

When the hatch is over the broken shells and the guinea eggs are removed from the nest, but Biddy and her family are not moved to the brood coop until the third day. The brood coop has an inclosed yard three feet long and one foot high attached to the front of it. Sides, front, and top are of five-inch poultry netting; the floor, matched boards, covered with sweeping from the haymow.

After two weeks mother and babies are moved into an inclosure—usually about 12 × 6 feet, with a coop for night use—where they remain for a month or six weeks.

FEEDING

As insects appear to predominate in the nestlings' diet under natural conditions, we attempt to provide them for the first few days, at least, though breeding maggot things,

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for the first young pheasants we ever reared was such a revoltingly nasty proceeding that, if the natural supply is scant, or difficult to find, the game babies, one and all, have to put up with home-manufactured substitutes.

Mr. Fred's youngest boy announced, when quite little, that he was going to be a "buggist" when he grew big; and, as he really did like hunting bugs and caterpillars, he entered into an agreement to collect plant insects and sell them to me for two cents a pint. It was truly surprising the number and variety of goods the "buggist" could collect, by means of a long cheese-cloth bag and a whisk broom. The bill, which was presented every Saturday evening during the season, often amounted to twenty-five cents. After bringing the catch to some of us grown folks to estimate the quantity, the "buggist" went the rounds of the little cannibals' inclosures, liberating a few of the dainties amongst each clutch. According to his report, the minute creatures collected from the wild blackberry

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and raspberry canes, tent caterpillars, grubs from old wood, ants, and all sorts of insects' eggs were preferred.

The regular diet for the first few days consists of custard, made by beating two eggs to a froth, pouring them slowly into three pints of milk as it reached boiling point, stirring constantly to prevent burning and cooking until almost firm. When cool, half a tablespoonful is crumbled, mixed with the same quantity of boiled rice, and constitutes a feed for the babies. "Little and often" being the only safe plan to pursue, they are fed five times between 5.30 A.M. and 4.30 P.M. Never being overfed, they amuse themselves by scratching and picking amongst the hay sweepings on the floor of the coop, to find small seeds, which furnished sufficient dry material to balance the rations.

After the third day custard dwindles to one feed a day, curds (pot cheese) being used in its place. Liver, which has been thrown into scalding water and left for a few minutes, is

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chopped finely and fed once every day—at first not more than a tablespoonful to a clutch—about noontime. Curds can form a separate meal, or be mixed with millet, pinhead oatmeal, or cracked hemp seed. Just a pinch of poppy and mustard seed are mixed with other things once a week. Plantain and groundsel are gathered and utilized for lunches. Chopped onions or garlic enter into the rations for all young poultry and birds, as we consider it a panacea for several chick ailments, chief of which is gapes. Small fruits, chopped apple, and lettuce are all eaten greedily. After the fourth week three meals are given—cracked wheat, corn, barley, hulled oats; in fact, almost anything which constitutes variety, which is the spice of life that seems to promote the health of all young birds, and is absolutely indispensable for the semi-wild ones, like pheasants and quail.

We have only had experience with the Bobwhite variety, but, according to recent reports from reliable people, the ruffed grouse can



A DOMESTICATED WILD DUCK

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also be reared and kept in captivity, and must be very interesting birds to study, with their habit of ruffling their plumage, which has given them their name.

Then there is the puzzle of the drumming to solve. Exactly what part of the bird's body the sound proceeds from has been a much disputed point with naturalists. Some declared that it was vocal; others that the wings, striking hollow logs, caused it. Recent investigation seems to indorse Professor Brewster's description, written for the *American Sportsman* in 1874, which I quote for the benefit of those who may never have heard the sound.

"I followed his direction, and soon espied the object of my search standing on the edge of a huge log, with his feathers ruffed up, and looking very disconsolate indeed. I approached cautiously to within about twelve feet, and sat down. For a few minutes he stared at me stupidly with outstretched neck, then resumed his indolent attitude. At length, when I had become nearly tired of waiting,

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he suddenly raised himself erect, and his whole bearing instantly changed. His tail expanded, his crest and ruff raised, he presented a most elegant appearance as he walked (I should not call it 'strutting') along the edge with a slow and dignified step, taking up and putting down his feet as you have seen a domestic fowl do on a wet day. Suddenly he paused, and sitting down on his rump and tarsi, crosswise on the log, with the tail slightly expanded and hanging down loosely over the edge behind, with body perpendicular, neck stretched to its full length and feathers drawn closely to the body, he stretched out his wings stiffly at right angles with the body. In this attitude he remained several seconds, and I was instantly reminded most forcibly of the pictures one sees of that singular family of birds, the penguins. Now the wings were drawn slightly back, a quick stroke given forward at the air, and a pulsating throb, entirely different from any sound I have ever heard, struck my ear, producing at such short range

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an almost painful sensation on the drum; the wings were immediately recovered, and another stroke, a trifle quicker than the first, was succeeded by another quicker still, until the wings vibrated too fast to be followed by the eye, producing the well-known terminal 'roll of muffled thunder,' and not till then the 'semicircular haze.' I say not till then, for the first two or three strokes could be distinctly followed by the eye. This over, the bird immediately rose to its feet, shook its feathers with an air of relief, and resumed its attitude of repose.

"I think the drumming of the ruffed grouse is produced by the forward beats of the stiffened wings on the air, the planes of their motion being nearly horizontal, about four inches in length, with the initial ends represented by the points of a wire passed through the center of the erect body, from side to side."

Another game bird which is easily domesticated is the wild duck. A friend who stayed with us one summer, whilst wandering about

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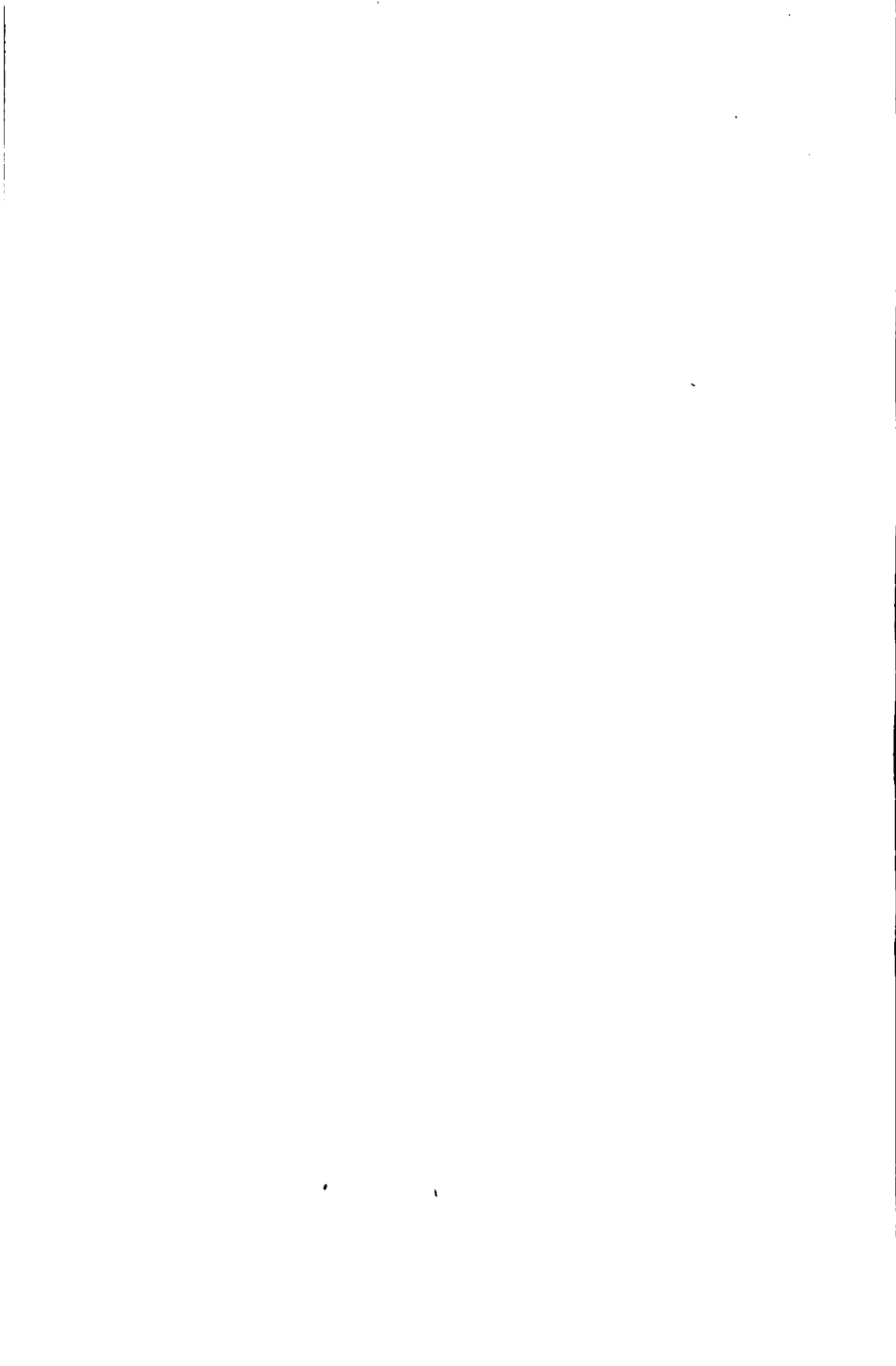
on a marshy strip of land the other side of the woods, returned with a much-mutilated duck in one hand and six eggs in his hat. Of course it was against the game laws to keep the eggs, but as the mother bird was lying dead close by the nest, our friend thought it no crime to bring the eggs home. I set them under a broody hen; then drove to the game warden's, showed him the dead bird, explained how she had been found, and gained his absolution.

In twenty-three days the eggs hatched, and the ducklings were as strong and contented with the hen mother as a brood of Pekins would have been. At first they had the same custard and rice feed as the other young game birds, supplemented by water from the marshy land. A pan was sunk in the ground, near the brood coop, and filled up at each feeding time. A fresh supply being fetched up night and morning, it contained innumerable water creatures and some duckweed, which the little fellows devoured eagerly.

The hen was kept imprisoned in the brood



AN ENCLOSURE FOR PHEASANTS



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coop for two weeks, after which she was allowed to walk out on the lawn with her charges from 9 A.M. to 4 P.M. Being an old hen, with strong maternal instincts, she continued to brood the foster family for eight weeks. After that we made a cage-like inclosure of wire netting at the end of the orchard, and extended it into the river, put a rough shelter at one corner and imprisoned one pair of birds.

In the marshy land, much farther from the house and farm buildings, another inclosure was made, six feet high, but having no wire over the top, as we wanted to try the experiment of allowing the birds their liberty when old enough to safely protect themselves. Before they attempted flight a natural wild duck was discovered in the yard one morning. Attracted by the cry of the young ones, it had evidently flown in over the top of the wire netting, which had confused and prevented its escape, for the poor thing was lying, half stunned, in a corner. It was captured and transferred to the inclosure in the orchard,

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where it soon became nearly as tame as the others.

Late in the season the young duck was removed, leaving the farm-raised drake with the wild duck. They were not allowed their liberty until the next spring, and subsequently they nested in the old winter shelter, rearing their brood without any assistance from us.

The wire was entirely removed from around the shelter in the marshy land early in the fall, but one feed a day was still provided. The birds became friendly with others of their kind, and at one time we thought they had deserted us, but in the early spring they returned to the old feeding ground, accompanied by several wild birds.

Stealthy watching and hunting revealed eight nests that year. Eighteen eggs were stolen in all and set under two hens, and sixteen young ones raised. Eight were sold for \$10 a pair to a gentleman who owned a large estate in Rockland County, and desired to

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establish a breeding ground on marshy land near a lake.

The demand for live birds has outstripped our capacity each year, so I am sure anyone going seriously into the business will find it very profitable.

CHAPTER TEN

GOATS

SEVERAL fields desirably situated for crops had become overgrown with brush during the years they had lain fallow and as it soon became apparent that we should require them in the near future, the most expedient and inexpensive way of clearing them became a matter for cogitation. Fire was too dangerous, surrounded by woods as we were. Building the large silo and a new poultry house was scheduled for fall work, so the farm staff would not have any slack time that year. Day labor was not to be had for love or money, because the city water company had corraled every unattached man to aid in the construction of a chain of walls which were required to supply the new reservoirs. I do not remember what first suggested goats for the work, though we

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had often talked vaguely about adding Angoras to the farm menagerie some day, having acquired a knowledge of the mohair market from South African papers, which a friend of the old wandering days still sent us every week. Then there was the memory of lunches amid the picturesque scenery of Norway, where a fondness for Molkenkase cheese had been acquired. But as woodsmen the useful little animals had never come under our observation. However, from some source the idea had evidently been conceived, and we determined to test its practicability. As Reika had drifted to us from the settlement of foreigners set in the woods some twelve miles back from the railroad, we consulted her on the possibility of finding any in the neighborhood, to discover, as we hoped, that they were kept almost universally in the settlement instead of cows. Being curious to see the collection of primitive foreigners, of which we had heard such odd accounts, the Master Man and I decided to pursue the goat quest personally.

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Two strong crates were securely fastened into the spring wagon, and we started off in true farm style. After the first two miles the travel was entirely through heavy-timbered woods, until the few shanties which constituted the settlement were reached. More forlorn homes could hardly be conceived. Even the patches of grapevines and vegetables scattered between the stumps of trees long since felled only accentuated the general desolation of the place. But as there were several goats and women staring in wide-eyed astonishment at us, we postponed our quizzical inspection of their homes, drew rein and attempted to explain our presence. The dear Master Man, who spoke French and Italian with colloquial fluency, was quite unable to make anyone understand, though they commenced to chatter violently among themselves in provincial *patois*. The confab terminated in a shrill voice yelling an extraordinary name full of "k's" and "c's," which brought a small tousle-headed urchin, with sharp features and

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soulful eyes, from some unseen retreat to act as interpreter. Even then signs and many of Reika's idioms had to be resorted to before the barter of two five-dollar bills for two scraggy goats was concluded. We subsequently learned that the colony had been originally gathered together by an old Norwegian who, after becoming prosperous and acquiring large contracts for felling timber, had collected waifs and strays at the emigrant office in New York, regardless of nationality so long as they were woodsmen. At first, he boarded them in a large shanty, subsequently selling to the best workers strips of land on which to put up shanties of their own out of any old material he happened to have bought cheap. After which the pious old rogue advanced money to bring wife or sweetheart, as the case might be, from the old country, and by such benevolent usury bound the poor wretches to lives of hard work, poor pay, and slavish obedience, which savored more of a Tolstoi novel than of real everyday life in a

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country place not forty miles from New York City.

But to return to the two scraggy goats the settlement had furnished us with. They were pure white, but of a nondescript breed, as pertinacious as most ill-kept animals, and possessed an appetite able to destroy incredible quantities of brush. They were neither of them giving milk when we bought them, but of course that had not been taken into consideration. When their kids arrived, and Reika owned to a knowledge of making Molkenkase and Mont D'Or cheese, we became interested in the amount and quality. Number One had two kids, and seven days later Number Two had one, all of which were weaned when five weeks old, when we were able to measure and test the milk. Number One gave five pints a day, Number Two three pints and a half; rather poor in quality, which was due to the nature of their food during the preceding fifteen weeks, so the brush was supplemented by a quart of mash every night, which



IMPORTED RAM AND DOES



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materially increased the richness of the milk and enabled Reika to make the coveted cheese, which was indirectly the cause of our realizing the marketable value of goat's milk. Among old friends who often came for week-end visits was a doctor from the city. One day, Molkenkase being on the table, brought up the subject of goats and the value of their milk for invalids and infants. The doctor asked us if it would be possible for us to let him have one quart a day, for a baby patient in which he felt specially interested. As we shipped eggs every day it was quite possible, and within a week he wrote enthusiastic thanks to our goat for saving the little sufferer's life, and begged us to make some business arrangement about supplying it for an indefinite time, and for other cases which might arise in the future. As the little patient was under the care of a grandmother not overburdened with wealth, we preferred to add the express charges to incidental expenses on the ledger, but agreed to supply future customers at twenty-five

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on our place, and we took advantage of every possibility to reach the goal. After the second generation the original buck was sold, and one from an entirely different strain bought, as we feared to risk in-breeding further than that. And again after the fifth generation a change was made. Of course the returns had been growing larger each year during the process of grading-up. After the first litter the males were kept instead of being sold as kids. Then each generation was sold after their second lot of kids were weaned. And the annual shearing, with the increasing number of does and wethers, commenced to be of marketable value after the third generation. Milk we made no attempt to sell, for having discovered its beneficial effect on infants and delicate animals, it seemed unwise to sell the small quantity we had, when all the kids were kept, even at twenty-five cents a quart. So, during the term of transition, cash returns did little more than pay for care and winter food, the real profit being in the amount of land

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cleared and fertilizer distributed. The eighteen acres of brush on which they were kept for the first two years having the fourth year brought in a clear profit of \$1,800, the area of the pasture had been greatly enlarged by their agency, and the fourth year they were utilized to demolish sprouts in a piece of woods selected by the Master Man for forestry experiments. It was second-growth, and the trees were being stunted by undergrowth, which the goats demolished with much gusto. We did not fully realize the superiority of Angoras until shearing time of the fifth year; then the length, weight and luster of the mohair gratified our pride, and subsequent sales proved more practically convincing than fifty blue ribbons that our herd had become truly thoroughbred. The aggregate weight of fleeces was 400 pounds, and the cash return \$193. Since then the demand for hair twelve inches long and over has increased, and prices have materially improved. In 1904 a lady who keeps Angoras received \$43 for the fleece

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of one female from a dealer in New York who always sets his own price. The actual return was \$10 for two pounds, \$28 for seven pounds, and \$1 for five pounds. The same dealer paid the Goat and Live-stock Company of Montana \$6.50 a pound for twenty-two pounds of long hair; but, of course, in both cases the mohair was especially long and fine, the animals which produced it having been bred and cared for under the supervision of clever and experienced owners. But, as the Department of Commerce and Labor reported in 1905, four of the leading mills of the country used 1,886,975 pounds of domestic mohair, and imported 1,174,935 pounds, it shows that the supply does not by any means meet the demand. Mohair is a chief material used in manufacturing upholstery plush, imitation Astrachan, lap-robcs, table and couch covers, wigs, and doubtless lots of things I don't know anything about, so can't enumerate. But as it has been estimated that 4,184,492 yards of plush had been

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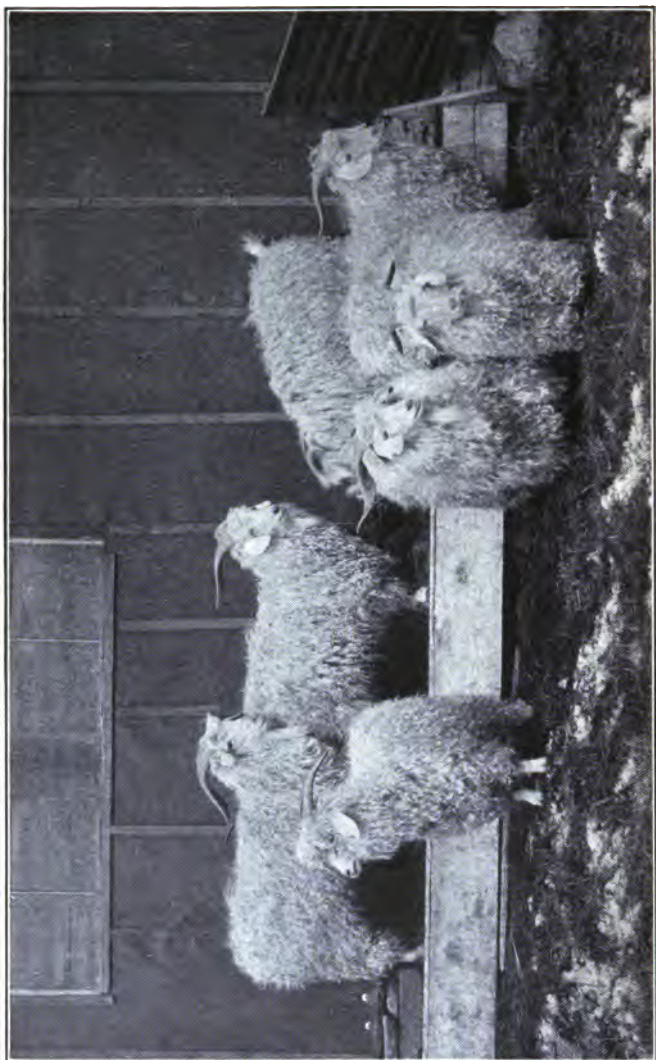
used in upholstering railroad cars in use during 1904, it seems as if that material alone would consume sufficient mohair to encourage farmers to keep small herds. About their economic value as land-clearers there are many erroneous ideas, some people—in fact, the majority—believing that the poor animal has to eat the entire bulk of material destroyed, and are therefore skeptical about their utility. True, the goats are naturally browsers rather than grazers, yet their efficacy as land-clearers lies in the manner of browsing rather than in the quantity consumed. They are restless, energetic creatures, who never settle down to take a meal in one place, but nibble leaves and sprouts as they wander about, cropping the young growth from many bushes in a day. Plants and shrubs depend on their foliage for air and much of their sustenance. Some species will succumb after one season's cropping, others possess sufficient sap and root-strength to spring the following year, but it is only a final struggle which exhausts them

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by the end of the second season. Of course goats cannot be turned into a young plantation or fruit-garden with impunity, even if there is tender brush and weeds for them to attack, for with the perversity of all living creatures, they are sure to destroy the most highly-prized specimens; but in the old orchards and woods where trees are more than twelve inches in circumference, it is quite safe, and they will perform most useful work.

ESTABLISHING FLOCK

If the desire is to establish an Angora goat farm, to the exclusion of all other agriculture, a large tract of hilly land, well covered with brush, should be chosen. From fifty to one hundred pure-blooded animals purchased to start with, which will require a capital of several thousand dollars, and involve much risk. If, however, the general farmer desires to abolish brush, primarily, and is contented to gradually build up the flock to a production



AMERICAN-BORN ANGORAS

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of mohair, the course we pursued is the most economical. No matter what sort of goats are first installed, the general care will be the same, as most of the common goats found in country districts are kept by foreigners for their milk. It is advisable to buy them when they are with kid, for then, being dry, they will cost less, and do the work of clearing just as well. As with all strange animals, the first point is to become friendly with them, and accustom them to associate some distinct call with food. Such training is best accomplished when confined in pens or a yard. If the goats all come from one flock, and are in the habit of herding together, they can be left loose in one enclosure, but if they are strangers to each other, they must be tethered at unreachable distances or in individual pens at night. During the day, until accustomed to their new surroundings, have them led out separately on to the land you desire them to clear, and tether by ropes not more than three feet long, to avoid their getting tangled up in the

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brush. Place them in sight, but not in reach, of each other, for several days. Their stations must be changed twice or thrice a day, or they will not be contented. If the browsing ground is fenced, they can be turned loose after a few days, unless any one shows a hostile spirit, in which case keep it on chain until it evinces a desire to be on friendly terms. In selecting a ram, choose one not under eighteen months, nor over six years of age. Subsequent males, especially the one who is to head the flock after it has become pure Angora, should not be over two years old, because by that time the females will number about forty, and there will be no necessity to change the sire, for if you desire to increase the flock, other rams will have to be kept for each additional forty or fifty females.

The age of goats can be told up to the age of four years by their teeth. The first year they are barely out of the gums, with a space between each. Second year, the two center teeth are much larger than the others, and

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touch each other. The third year the four center teeth are of equal length, and touch. The fourth year there are six in the group; the fifth year there is little difference, except that the end teeth on each side, which complete the goat's full complement of eight, may appear a little longer and closer together. The goat's best years for breeding are from one to six, and the average length of life twelve years. The ram should have a fairly good-sized house and yard for his exclusive use, and this should be some distance from the cows' stable, as even with the Angora breed, whose males are almost exempt from the natural and objectionable odor which the males of all other varieties possess, there are seasons of the year when it is sufficiently strong to taint milk, should he be kept in close proximity to the cows' stable. There is a belief among old-time horsemen that a "billy" is a mascot around stables, and though it may only be an old-fashioned superstition, sprung from some accident, our

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Mr. Fred considered it as unquestionable as Holy Writ, so the ram has always been stabled with the horses, and—well, we have never had a sick horse. Perhaps it has all been chance, perhaps the power of Mr. Fred's faith, but an empty stall is easily fitted up for the gentleman, and the companionship of the horses and stablemen render him more friendly than he otherwise would be, if condemned to solitary confinement. The does were housed at first in what was afterward made into a sheepfold, but later a separate house was built, 35 feet long, 20 feet wide, 10 feet high in front, and 7 in back. The peaked roof extended one foot beyond the back wall, and 12 feet beyond the front wall, so making a cover to the yard, which was boarded half-way up at the ends, and enclosed by wire netting six feet high across the front. Three windows were placed at the back of the house, three others in front, and a small one high up at each end. The interior was fitted with pens along the back, each a little over

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two feet wide and four feet long. A suspended iron rack for hay was hung to lean down over the box manger, into which fitted iron pans a foot square and deep, for feed and water. A passage-way two feet and a half wide ran between the back of the house and the front of the pens, for the convenience of the feeder. The remainder of the house was left in one compartment, with a platform two feet wide and one foot high, running the entire length. The floor covered with concrete and drained after the plan used in cow-barns. In the yard there was a rack for hay, troughs for feed and water, and a box for rock-salt. The ground selected was shaly and naturally drained, but when such is not available it should be sub-drained, and the soil in the yard removed to a depth of three or four feet, and replaced with cracked stone, topped with coarse gravel.

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FEEDING

From April to November goats browse from morning until night, really needing no other food but a small feed at supper time. Encourage them to return to the fold at night, and save much trouble. From November to April the food is to be regulated by condition. If the weather remains fine and dry the herd can be turned out in the morning without breakfast. But as nutritious herbage will be getting scarce, supper ceases to be a mere decoy, and hay must be put into the racks and oats into the feed trough in the yard, in the proportion of a pound and a half of hay and half a pint of oats per head. If the mornings are damp and stormy-looking, they should be kept in, and receive the same rations as at night. If the day clears before noon let them out, but if discretion counsels their being kept in the yard, they must receive a lunch of roots, pea or bean haulm, or corn stalks. When continued bad weather necessitates keeping them

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at home for a number of days, variety is supplied at lunch time by very small quantities of silage, oak leaves, acorns, and horse-chestnuts; these three last being collected and stored in the fall. We always give a few acorns and horse-chestnuts when silage is first fed, as they are astringents and counteract the effect which unaccustomed grain food might cause. Trim-mings from the orchard and fruit garden will also be thankfully received by the prisoners. Goats of high or low degree are most fastidious about the cleanliness of their food, and will refuse to eat turnips or other roots unless they have been thoroughly washed, nor will they eat hay or fodder of any sort which has been tainted by mud or the stable floor. Hence the necessity for racks so arranged that the contents cannot be thrown on the ground.

INCREASING FLOCK AND CARE OF THE KIDS

To insure strong, full-sized animals, the doe should not be bred until she is one year old, though at the commencement of grading up

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our flock many does were bred when only nine months old, but they still possessed much of the blooded plebeian strength of their maternal ancestors. With thoroughbreds, whose progeny must come up to standard size and weight, it is safer to go more slowly. October and November are the best months for pairing, because from the end of February to the end of March is the best time for the kids to arrive, as the farm men have more time at that season, and the kids will have time to develop sufficiently to go on range with the flock in April. Moreover, the does can be handled more readily at shearing time. Both ram and does should receive slightly heavier rations from September. Put up a temporary hurdle fence to divide the main compartment of the house and yard; place the wethers on one side and does on the other. Each day as a doe returns from ram's stable she should be put with the wethers, her number and date of service recorded for future reference, and two or three days before the expiration of the twenty-

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first week, she is to be put into one of the small pens. There is really no necessity to interfere with natural events, but after the kids arrive some persuasion may be necessary to induce them to nurse. Mother and babies are kept in a small pen three or four days, and then turned into the main compartment with free access to the yard, unless the weather happens to be wet, in which case a board eighteen inches high is put across the opening, which allows the does to go out if they wish, but retards the babies. Male kids should receive a veterinarian's attention before they are three weeks old, for the sooner they are "transmogrified" into wethers the finer will be their fleeces. Males to be retained for sale as mature rams must not remain with the does after they are five months old under any circumstances. We anticipate this time by a month or six weeks, as experience has convinced us that the kids are just as strong and develop as well when weaned between three and four months old as later, and breeding is materially



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facilitated. A creep like those used for the lambs is fixed up in the goat-house, and a mixture of bran and ground oats is kept in a trough, so the little ones can run in and out and help themselves. Clover hay is put into a basket made of ordinary two-inch wire netting, and suspended inside the creep. The amount which disappears before the babies are two months old is convincing proof that something more than the maternal supply of food is enjoyed and required. Kids are marked on the inner side of the left ear with the doe's number and year; on the right ear their own number is inscribed. We use ordinary marking ink and a fine, stubby camel's-hair brush. The youngsters will pass through the dangerous time of infancy in safety if they are guarded from damp and allowed plenty of light and air, but this same rule applies to goats all through their lives. Zero weather, if bright and dry, is positively beneficial to them after they are two months old, but rain and snow are disastrous to health and fleece, for which

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reason rough shelters should be provided on the browsing ground even in summer time.

THE FLEECE, MOHAIR, AND KEMP

The fleece contains two distinct materials: the top or outside growth of white lustrous hair, which hangs in wavy ringlets, and constitutes the material known as mohair, under which there is a growth of short, coarse hair, technically known as kemp. Writers on the subject, who are reliable authorities, assert that kemp is the result of cross-breeding practiced years ago in Turkey. A gentleman who had many years' experience with goats in the vilayet of Angora is quoted as saying that in 1863 there was hardly a perfectly pure-blooded goat to be found, and ascribes the reason to extensive crossing with the common Kurd goat, practiced with the idea of meeting the ever-growing demand for mohair, so the first long-haired goats brought to America in 1849, must have borne the taint of plebeian blood, mingled with Angora, though for a

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long time they were supposed to be Cashmere goats. According to Israel Diehl, there are several breeds of goats in Turkey which have long hair, and could easily be mistaken for Angoras; he describes them as follows in the agricultural report of 1863, in which he wrote at length on wool-bearing goats and the mistaken classification of the species brought to this country in 1849:

“There is also a second or other variety of Angora, or shawl goat, besides those generally described. This goat has an unchanging outer cover of long, coarse hair, between the roots of which comes in winter an undercoat of downy wool that is naturally thrown off in spring or is carefully combed out for use. A remarkably fine species of this breed exists throughout the area to which the white-haired goat is limited, and similar breeds prevail all over the highlands of Turkish and Persian Armenia, Koordistan, and at Kirman; and although some flocks yield finer fleeces than others, it is called the same wool or under-

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down as the wool of Cashmere and Tibet, and samples of the wool of the Tibetan and the double-wooled goat of the banks of the Euxine show them to be but varieties of the same species.

“This goat is of a larger size than those of the more southern Turkish provinces, and its wool is finer, and is the variety probably introduced by Doctor Davis from Asia Minor as the Cashmere, and now erroneously so-called throughout the country, as all the importations of this country, as far as we can learn, were shipped from ports on the Mediterranean or Constantinople, several thousand miles from Cashmere or Tibet, through inhospitable and almost untraveled countries for Europeans, which goes far to prove the so-called ‘Cashmere’ goat to be the Angora.”

In the same article he refers to the true Cashmere as “somewhat smaller than the common and Angora goat. It has straight, round, pointed horns; pendent ears; is covered with straight and falling long, fine, flat, silky

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hair, with an undercoat in winter of a delicate greenish wool, of but two to three ounces each, which latter alone constitutes the fabric from which the celebrated shawls are made. Ten goats furnish only enough for a shawl $1\frac{1}{2}$ yards square; but this is often found differing both in color and the quality of the wool, or rather the fine hair, of which the fleece is composed. The principal points in the most approved breeds are large ears, the limbs slender and cleanly formed, the horns not spirally twisted, and, above all, the fleece being long, straight, fleecy, and white."

Of the Angora he writes:

"The Angora goat, and more especially the varieties it has produced, are probably the most valuable of all the goat family, and have been ably described by Naturalists Buffon, Pennant, Hasselquist, and travelers as good-sized animals, generally of a beautiful milk-white color, with short legs and wide-spreading, spirally-twisted horns. The wool is described as a very beautiful curled or wavy

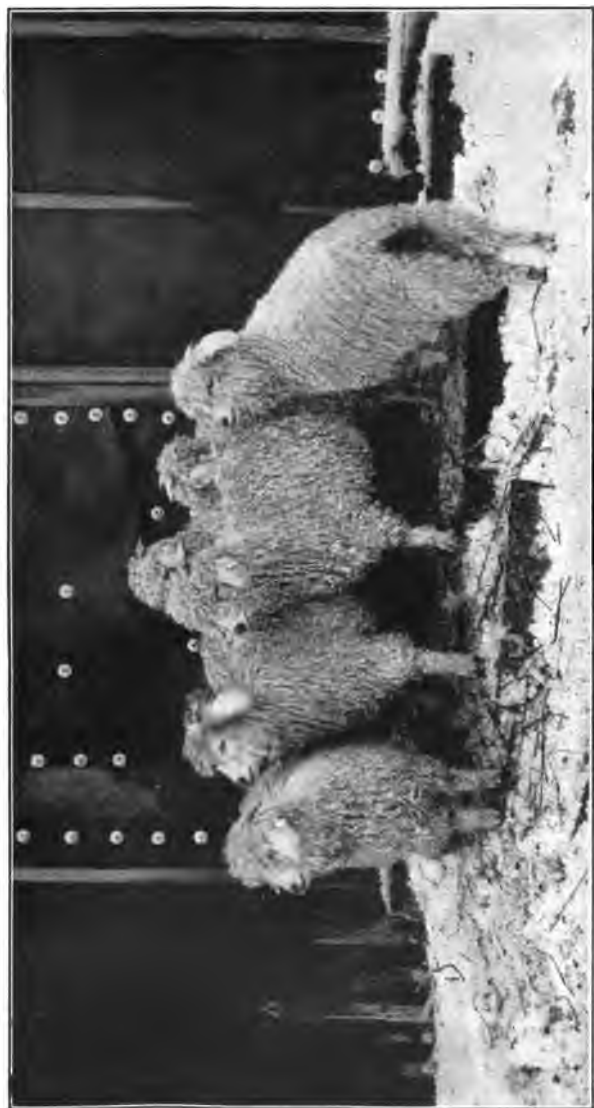
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hair of silvery whiteness, with a fine downy wool at its base, and this hair is disposed in long, pendent, spiral ringlets on the whole body. The horns of the female, instead of spreading, as in the male, turn backward, and are much shorter in proportion. Those of the male are long, spirally-twisted, but the size and direction are very different from the common goat, being generally extended from fifteen to thirty inches in height on each side of the head, while those of the females are near the ears. The hair, or wool, often sweeps to the ground, and is usually from five to twelve inches long, especially in the older bucks, but then not so fine."

All of which data seems to prove that kemp is not a characteristic of the true Angora, and that the systematic culling and breeding which has been exercised recently will eventually result in reëstablishing the original type of Angora, with "fine, downy wool" under the mohair, instead of the coarse growth they now have. When building up a flock from com-

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mon does, it is imperative to select white, short, smooth-haired animals. We had one doe with shaggy hair, and the fleeces of her progeny up to the sixth generation were twice as heavy with kemp as those of smooth, close-haired does. The second and third generations will appear almost perfect Angoras to a layman, but when shearing time comes the amount of kemp will shatter the delusion, as the relative quantity of kemp and mohair, and the texture and luster of the latter is the crucial point, and proclaims the animal's ancestry. Up to the third generation fleeces will possess little value, but in the fourth generation mohair should predominate, increasing and improving in quality with each succeeding generation if the herd is well managed. Sudden changes of climate and food affect the texture, so these must be avoided as much as possible by providing good houses, and making the necessary changes of diet in spring and fall very gradually. Except in the southern part of the country, shearing is done in



KIDS, FOUR AND FIVE MONTHS OLD



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the spring; it is an operation needing courage and experience, which is much better gained on sheep, as they are still and gentle when frightened, which, of course, all poor creatures are under such unaccustomed treatment. The two important points are not to hurt the animal, or cut the hair more than once. The nervous and inexperienced man is apt to take two or more "snips" before really severing the fleece, which materially injures its marketable value; length being even more desirable for some purposes than luster or texture. Having sheep as well as goats to shear, we bought a machine for the work, and found it a great saving, both in this respect and time. As a fleece falls from a goat it should be rolled up, inside out, but not tied or fastened in any way. In the South shearing is done twice a year, because the mild climate is apt to cause shedding, but as the mohair cannot gain its full length in less than a year, nothing can be gained by adopting the custom in this part of the country.

CHAPTER ELEVEN

THE WOOD-LOTS

LIKE other Philistines, we delighted in the beauty of the woods in summer, enjoyed the warmth and cheering companionship of the fires we ruthlessly filched from them in winter, but gave no thought to the future until a pamphlet issued by the Bureau of Forestry showed us what awful ingrates we were. Being only tenants, we could do little to repair past neglect without our landlord's permission.

Therefore I determined to try and gain his co-operation, and to my great astonishment, found he had received, read, and actually approved the same pamphlet that aroused us.

Dear old gentleman, it appealed to him from the human standpoint of duty to

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posterity, so in spite of his dislike of anything approaching scientific husbandry, he supplemented our lease by an agreement, giving us full power to cut and sell wood as might seem advisable, the money from such sales to be held in trust until our option on the farm expired. Then if we failed to conclude the purchase, it reverted to Mr. E.

Being anxious to justify his trust and kindness, we took up the study of forestry on a most elaborate scale, but drifted into a delightfully vacationy sort of a time.

The Master Man was able to remain home until Christmas. It was a glorious autumn, and the daily tramps through the woods, in search of practical information, were full of unexpected interests. Sometimes it was only a rare fern, or a bit of moss for our wild garden. But oftener it was a glimpse into the real workaday lives of the little creatures that called the woods home. The fall of the leaf is their summons to work, and natural shyness is forgotten as they hurry about preparing for

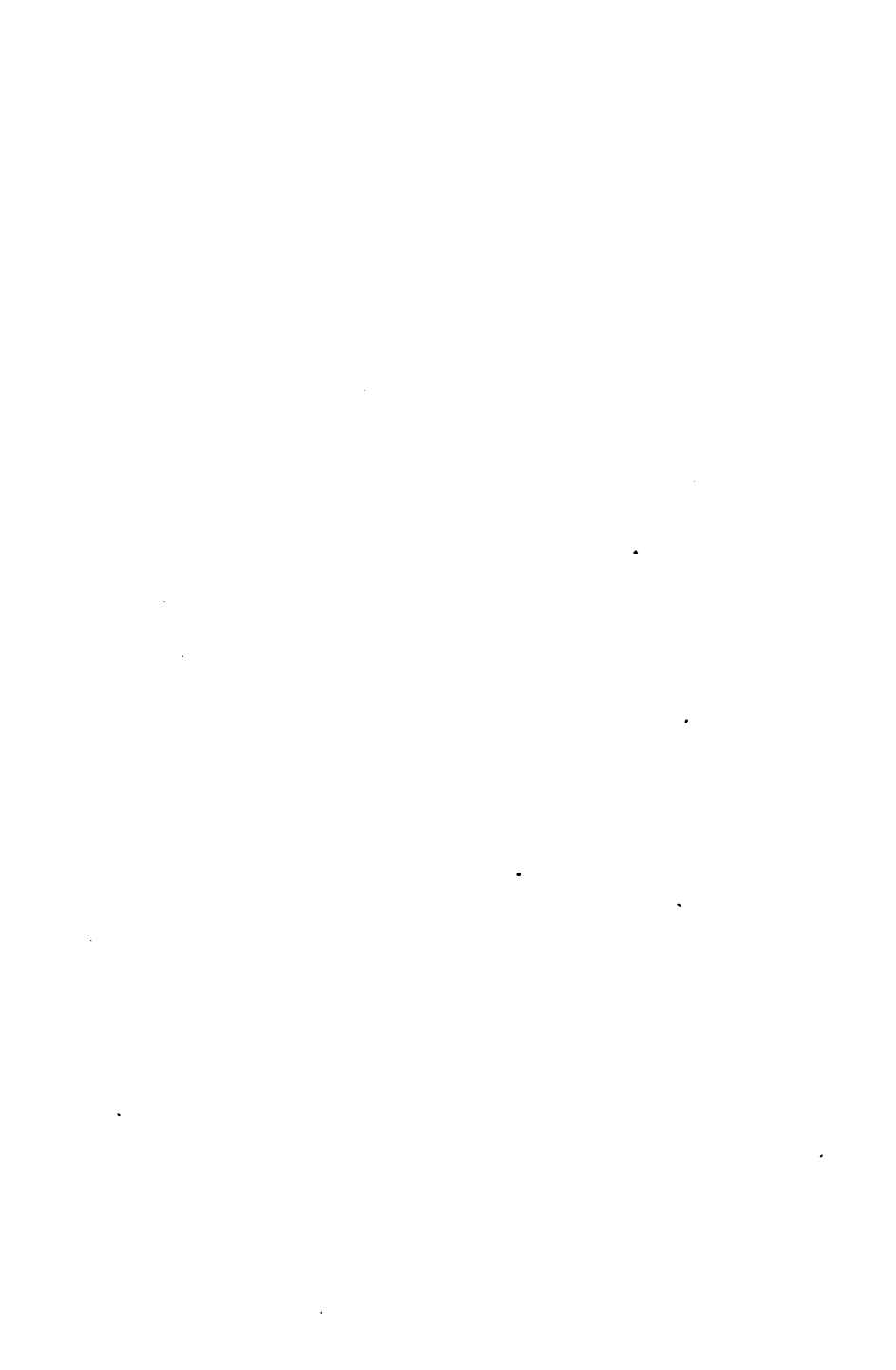
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winter. So a cautious, watchful human can learn more of their actual habits at that season of the year than at any other.

Birds and animals are supposed to possess an unerring instinct about seasons; yet there were many babies still in the woods who, according to all natural history lore, should have been born in the spring or early summer.

One day we found a belated baby squirrel, who had lost his mother by some mischance, and was starving to death because his teeth were not strong enough to eat the hard food which surrounded him. Another time, a young opossum, who had been shot in the shoulder; then two half-fledged monkey owls. Of course all such waifs and strays were carried home, and in time became pets.

Day after day we return home buoyantly happy, and as hungry as hunters, to enjoy a tea of home-grown luxuries. Then we would settle down before a big open fire to study; read for perhaps an hour; strike an assertion which some other authorities or our





REMOVING CLUMPS OF TREES IS A MISTAKE

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own observation combated; drop the books, and proceed to "thresh things out," as the Master Man used to call amiable argument.

Talking helped us to unravel lots of difficult technical points, and did not interfere with cooking some tidbit, gypsy fashion, in the wood ashes, for the late supper which old Bohemian habit made indispensable; so altogether there was more homely enjoyment than real work about our study hours.

There were three wood-lots on the farm: the largest and most valuable was the forty acres of real old forest which joined—or rather was part of—hundreds of acres known as the "Green Woods." Next came twenty acres: trees of all ages, dividing the Wilbur and Earl homesteads. Last, thirty-two acres behind the orchard; saplings and second growth. Besides these were several clusters of nut-trees, scattered about between meadows and pastures, the majority of which had long since passed their zenith, and were deteriorating in value each year.

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The first to be condemned were two immense black walnuts which stood at opposite sides of a glen that, according to tradition, had been the high road to Boston in Revolutionary days. They were splendid old veterans, and it seemed positively sacrilegious for puny, short-lived human creatures to ordain their end.

It may seem absurd for a prosaic business woman to own that she regards old trees with a feeling of awe; but I do, and have done, ever since an evening in early childhood.

My father had undertaken to play nurse as well as courier from Paris to London, because my grandparents wished me to spend Christmas with them. I don't remember the beginning of the journey at all, but after arriving at Dieppe everything is vividly clear. A severe storm was raging: the Channel steamer could not put out, so we went to a hotel, and for the first time in my life I dined with my father. Dining by gaslight when I should have been sound asleep in bed made me feel quite grown up and

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very grand, until the dad proposed saying good-night to me in a strange room. Then dignity evaporated, and a very nervous, small child begged for a story.

The dear dad was never very good at fairy tales, and usually responded to such requests with simplified scraps of history or mythology. That night, the storm, and the wood fire burning on the hearth, must have turned his thoughts to German forest-lore, for he related legend after legend, not realizing that he was frightening me half to death, and inculcating ideas that would last into maturity. But so it was; and even now, alone in the woods, when the trees sigh aloud, or sitting before a log fire that hisses and splutters, I invariably find myself wondering what special kinds of spirits are clamoring for pardon, or what incarcerated diabolicalness is being consumed.

But even without these foolishly superstitious ideas, ancient sentinels such as these walnuts would have claimed regard. They looked

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perfectly sound, but examination revealed the presence of decay that had started at the ground-level and was creeping up the centre of the trunks.

One firm bought the first twenty feet of each trunk, which measured respectively sixteen and eighteen feet in circumference, to be cut up into table-tops, and gave three hundred dollars for them. The large limbs brought another hundred and four dollars; after which there was a lot of wood, worth at least two dollars and a half a load.

Felling, tearing up the stumps, and planting saplings in their place, we estimated had cost five dollars. In a general clearing-up of the "Green Woods" and the Wilbur-Earl lots, the following marketable material was removed:

Two hundred and twenty-two first-class ties at seventy cents each; seven hundred second-class at forty-five cents each; six thousand four hundred and sixteen first-class posts at twelve cents each; one thousand six hundred and twenty second-class posts at seven cents

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each, and a supply for home consumption which lasted into the third year.

The orchard lot was not attacked until a year later. Brush and weeds had gained a strong footing, so we turned in the goats; then thinned out the sprouts sufficiently to allow the young trees to develop. The cutting realized twenty loads of stove-wood, which sold at two dollars per load. The farm staff did much of the work. We had the saw outfit, so there is the usual difficulty about estimating the actual cost of work, except extra labor, specially employed, which was two men for thirty days, at a dollar and a half a day each, during the first year; one man in the orchard lot for five days the second year. As the work was done to improve the future value of the woods, and not for immediate profit, we were more than satisfied with the results.

THE WORK OF IMPROVING

Before attempting any active work, the conditions peculiar to woodland growth should

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be understood, or it will be impossible to avoid violating some of the laws of reciprocity which nature has united with such wonderful accuracy that no one can be impaired without injury to the system of co-operation which governs the entire community. Perhaps the most important, and certainly the most distinctively silvicultural characteristic, is the soil; or, to be more correct, the ground cover. There is no condition quite like it to be found outside of woodland boundaries. To a casual observer it is only a deep carpet of dead leaves and waste material. But to the forester it is a great power, to which deferential consideration must always be shown, for on its condition depends germination of seeds and the principal food supply of trees throughout their lives.

Each autumn, when trees shed their leaves, a fresh mulch is spread over the surface of the ground, and the lower layers of preceding years progressively succumb to age, the fleshy parts melting into a solutive fertilizer which

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liberates and holds in solution the several mineral compounds of the soil which constitute plant food. The fibrous residue of stems and veins accumulates; gradually disintegrates, and eventually becomes rich loam.

After ground cover, general tree growth and the idiosyncracies of different species should be understood. The majority of trees can be divided into two classes: tolerant and intolerant; which means that some species can endure heavy shade until past sapling age, whilst others must have full light from sapling age. (Seedlings of both classes are benefited by partial shade.) According to the classification made by the Forest Service, young trees are seedlings until three feet high; small saplings until ten feet high; from then until they reach four inches in diameter at about four feet from the ground, large saplings.

It is generally safe to class the trees which make dense top-growth under the heading of tolerant, and those with light top-growth,

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through which the sun can easily penetrate, under the heading of intolerant. But there are several exceptions to this general rule. If the dense crown species predominate in mixed woodlands, the coming generation will almost surely be of the tolerant class; for the seedlings of this class will steadily develop to the sapling age, and even if retarded from further growth by want of space, will sustain no vital injury, but simply remain stationary until age or the woodsman's axe clears the way for them, when they will shoot up vigorously.

But seedlings of the intolerant class would pine and gradually die, or at least become so debilitated that they could not avail themselves of favorable conditions when they occurred. As an example: If seedlings of cottonwood, black walnut, white pine and hemlock are all growing in close proximity, the quick growth of the first two species would make so much shade that the pine would be killed, the hemlock checked, but not injured. Later a



THE LAYERS OF LEAVES KEEP THE SOIL MOIST AND MUST NOT BE DESTROYED

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duel for supremacy would commence between the cottonwood and the walnut.

A tree is made up of three distinct parts: roots, trunk, and branches. The roots gather food from the soil, which travels up the trunk to the leaves, where it undergoes a sort of digestive process, and is then distributed to the different parts of the tree. Growth is, or should be, made simultaneously in three directions: height, spread of branches, and circumference of trunk and limbs. Height and spread are increased by the new growth made each season at the extremities. Circumference of trunk and limbs depends on a glutinous substance which travels to all parts of the tree, between the real wood and the bark, and is really composed of three layers; the inner and outer ones being divided by a tissue-forming quality, technically called the cambium, which acts upon the inner and outer substances, turning the inner into wood and the outer into bark, so adding a new coat to each every season through a tree's growing years. There is an-

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other but inferior cambium, of corky substance, which fills irregularly, and forms the rough outer bark seen on some trees. Gifford Pinchot describes this annual deposit or growth as follows:

“Cells of new wood formed each year at the inner surface of the cambium are arranged in a definite way. When growth begins in the spring, and the fresh twigs and leaves are put out, there is a great demand for water in the crown to supply these moist green new parts of the tree. Water rises in most trees through the newer layers of the wood, and especially through the last ring. Consequently, at first the tree makes thin-walled cells with wide openings, through which water can rise rapidly to the ends of the branches. Later on, when the demand for water is not so great, and there is plenty of digested food to supply building material, the cells formed are narrow and thick-walled. Thus the summer wood in each year's growth is heavier, stronger, and darker in color than

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the spring wood. In the wood of many broad-leaf trees, such as oak and chestnut, the spring wood is also marked by a band of open tubes of larger size, called ducts. In others, such as maple and beech, these ducts are scattered through the whole season's growth; and in all conifers, as, for example, the pines and cedars, they are entirely wanting. But the differences in hardness and color between the growth of spring and summer are still present. It is sometimes possible to see the line which separates the growth of two seasons in the bark, as in the case of common cork, which is the outer bark of the cork oak, a native of southern Europe.

“If the trunk or branch of an oak tree is cut smoothly across, thin whitish lines may be seen running from within outward. Some of these lines begin in the centre of the tree, and others in each one of the annual rings. There are the medullary rays, which make the silver grain in quartered oak and other woods. They exist in all kinds of trees, but in many—as, for ex-

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ample, in the chestnut and in most conifers—they are so fine as hardly to be seen with the naked eye. Seasoning cracks which run across the rings of growth always follow the lines of these rays, while others most often follow along some annual ring.

“It is correct to speak of these rings of growth as ‘annual rings,’ for as long as the tree is growing healthily a ring is formed each year. It is true that two false rings may appear in one year, but they are generally so much thinner than the rings on each side that it is not hard to detect them. Very often they do not extend entirely around the tree, as a true ring always does if the tree is sound. Whenever the growth of the tree is interrupted and begins again during the same season, such a false ring is formed. This happens when the foliage is destroyed by caterpillars and grows again in the same season, or when a very severe drought in early summer stops growth for a time, after late frosts, and in similar cases.



TWO DAYS AFTER FINDING THEM

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“An annual layer once formed does not change in size or place during the healthy life of the tree, except that it is covered in time by other, younger layers. A nail driven into a tree six feet from the ground will still be at the same height after it is buried under twenty or fifty or one hundred layers of annual growth, but in most trees, like the oaks and pines, the wood becomes darker in color and harder after it has been in the tree for some years, the openings of its cells become choked, so that the sap can no longer run through them. From living sapwood, in which growth is going on, it becomes heartwood, which is dead, because it has nothing to do with growth. It is simply a strong framework which helps to support the living parts of the tree. This is why hollow trees may flourish and bear fruit.

When the tree is cut down, the sapwood rots more easily than the heartwood, because it takes up water readily and contains plant food, which decays very fast. Not all trees have heartwood, and in many the difference in color

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between it and the sapwood is very slight. Since water from the roots rises only in the sapwood, it is easy to kill trees with heartwood by girdling them, provided all the sapwood is cut through. But in those which have no heartwood the tubes of the older layers of wood can still convey water to the crown, and when such trees are girdled it is often several years before they die."

In a young forest, the rapid growth of tolerant species not only retards and overtops their intolerant cotemporaries, but in time, as their own branches spread and come in close proximity, they lash and slash each other every time a breeze sways the trees. Thus the young shoots at the extremities are broken off, which checks growth in that direction, and stimulates it in the trunk and upper branches. Over-shadowed by the increasing topgrowth, which robs them of the power to assimilate food, the lower branches gradually die, and are eventually severed from the trunk, either by a storm or by their own weight. Then the annual de-

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posit of wood and bark from the cambium heals the wound in the trunk, which increases in unbroken circumference many feet above the ground. It is this natural pruning of the lower limbs which makes forest trees so much more valuable for timber than segregated specimens that retain all their branches, and cause the annual deposit of wood to be diverted to increase the limbs.

Of course, volumes and volumes have been written by scientific foresters on silvicultural laws, and the foregoing is only a condensed summary of what has been gleaned from desultory reading; but if supplemented by personal observation and gumption, it may help you to reason out some of the whys and wherefores of past deterioration and of the work necessary to bring about improvement in the future. Commercial lumbering has, of course, depleted the large forests, but the farm wood-lot has been and is being ruined by the farmers themselves. A mistaken idea of thrift permits them to

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start ground fires to promote the growth of grass on which to pasture cattle; the argument being that ground fires only burn up brush and dead rubbish, and do not injure mature trees. But brush must necessarily include seedlings, and even saplings, on which perpetuation depends. Dead rubbish is the ground cover on which trees of all ages depend for their principal supply of food.

Even a slothful farmer, who just turns in cattle to browse in winter, commits a ruinous blunder, for browsing does incalculable injury to coming generations, and the damage caused by trampling and sharp hoofs is nearly as destructive to the ground cover as fire. So, all things considered, pasturing cattle in the woods is about the most shiftless proceeding which can be perpetrated in husbandry.

Want of judicious selection in cutting trees is another of the blunders which even the most elementary knowledge of forestry will prevent. Since being enlightened, our plan is first to consider the tree as a unit. Has it



"GIP"

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reached its full growth? If so, it should be removed before it deteriorates in value. Second, what is its value to its neighbors? If they are a mixed crowd of well-developed but still growing trees, it is cut down without further consideration, as the neighbors will soon spread and fill the space left by its removal. But should the adjacent growth be many generations younger, it is allowed to remain, because its removal will permit too much sun and air to reach the ground. Moreover, deprived of the annual benediction of its leaves, the soil would cease to produce the amount of plant food required by the growing crop.

But should the tree under consideration be seriously decayed, species has to be taken into consideration. If it is a chestnut, it is decapitated about three feet above the ground, the cut being made diagonally across the trunk, to prevent water lodging on the stump, which would cause decay. Such a chestnut stump quickly sends up a goodly stock of sprouts, to furnish shade for the ground, and leaves to

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fall in the autumn. But if the veteran should be an elm, hickory, or walnut, it is patched up, if possible, with concrete, as carefully as if it were an orchard tree. All trees, irreclaimably decayed are cut down, no matter what their neighbors' ages may be, to avoid the damage their natural downfall would be sure to inflict on others.

On several occasions, being compelled to remove large trees when there was no hope of the space being quickly filled by natural growth, we have transplanted several large saplings, and thinned out later.

From our very initiation, the nursery branch of forestry has been a pet hobby. It is really as easy to grow trees as to grow vegetables; and the joy of having strong, well-shaped specimens of the species best adapted to the vicinity and the purpose for which the wood is to be ultimately used, is unquestionable.

Marketing nursery stock must be a profitable business, for though we never made any

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effort to sell, the requests for trees were so constant that at one time we contemplated going into the business extensively.

Having plenty of mature trees of all the species we desired, we have always gathered our own seed, which perhaps accounts for the good luck we have had in this branch of the work; for on the proper treatment of the different seeds depends the germinating power. My first attempt was with catalpas. We had one magnificent tree at the corner of the house, which covered nearly half the roof. It was our joy and pride, especially in June, when its exquisite white blossoms perfumed the entire vicinity. It was the desire to have an avenue of like beauty up to the buildings which made me think of trying to raise young ones from seed. The first year I collected pods, and put them in paper bags.

Next spring many of the seeds were mouldy and useless. About fifty were planted in plots a yard square and about a yard apart, each side of the drive. Several seeds were planted in

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each square. Eleven came up. Two died as seedlings; the remaining nine had a sickly childhood. All gave up the struggle for existence by the end of the year.

Then a strip of sod land which had been used for potatoes and corn, rape and rye, in succession, was set aside as an experimental nursery for trees. One-half was divided into three seed beds, and three given over to transplanted seedlings, home grown, and collected from the woods. Our purpose was to rear trees of the species we wanted for a wind-break across the new chicken-house; a narrow plantation along the bank of the river, where trees had been ruthlessly removed; and an avenue from the house to the barn and buildings. For the second venture, the catalpa seeds were removed from the pod, spread out on papers in the light, and when dry, tied up in sugar bags. In the spring they were planted two inches deep and ten inches apart, in rows two feet apart. Nearly all the seeds came up, so we thinned out considerably. The bed was weeded and

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cultivated all through the season, just as if the plants were ordinary vegetables, with two exceptions.

Early in their life history, the seedlings commenced to die out, and to prevent transplanting into another bed, a layer of fine sand was scattered over the ground, and drawn up around each plant. Catalpas belong to the tolerant class of trees, and as the bed was in the open, a temporary shade was erected over them, by driving stakes into the ground, stretching poultry wire over them, and over that cedar boughs.

Later, we adopted the hurdle made of slats, recommended by the government. They are just rough frames, with slats and equal spaces alternated, supported on posts three feet high. The following spring, when the seedlings were one year old, they were transplanted, left for two years and then set out in their permanent homes. That was eight years ago. They now range from twelve to fifteen feet in height.

Cottonwoods were started at the same time,

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and cultivated in the same way, except that they were thoroughly drenched with water three times a week during July and August, when the weather happened to be very dry. The seeds did not germinate as well as the catalpa, but the seedlings were strong, and grew very quickly. When two years old, they were transplanted to a low pasture ground, where we desired to establish shade for cattle. Several died, but as they had been planted in groups, it only saved thinning. Those which did survive are now about twenty-three feet high. Cottonwood is not of much value, but it makes extremely quick growth in moist land, and I believe has a marketable value for barrels and packing boxes.

Black walnut, hickory, and butternut were the predominating species in the home woods, so we hunted out specimens three or four years old, but not being sure of the result, seeds were collected in the fall, and wintered over in a pit. It was dug on the side hill which runs down from the back of the barn, to keep out

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four-footed thieves; it was lined with half-inch wire netting.

The outer hulls were removed from the nuts, and then they were packed in alternate layers with dry sand, a piece of wire netting put over the top, fastened down to the sides, and then covered with a conical-shaped pile of earth, to prevent rain or snow from accumulating and sinking into the pit.

Before being packed, the nuts were placed in an air-tight box; a small pan, half-filled with carbon bisulphide, placed on the top of them, the lid shut, and left to fumigate for twenty-four hours. The fumes or gases of the carbon bisulphide permeate the entire box, and effectually prevent the nuts being attacked by weevils or grubs.

Oaks were quite scarce in our neighborhood, so we begged acorns from a friend who had a place in New York State, gathering them as soon as they fell, and storing them in the same way as the nuts. Maple sugar being one of the dear Master Man's weaknesses, we set out

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one bed of seed, to insure some other people's "childrens" having tree-drip for their cakes. At least that was Reika's quaint comment on the work. We had trouble the first season with the maple seed; then we discovered it was very short-lived, and that it was better to seed when it falls in the springtime, like willows, birch, and elms, the seed of all which should be used as they ripen in spring. The pines and firs we collected as seedlings in the woods, thereby saving three or four years. The nursery beds really cost nothing except a very little time; and a small notice which some one gave us in a local paper the fourth year after we had started, brought us customers for four hundred trees, which we sold at the nominal price of five cents each; but that fully paid for the man's time in planting our wind-break and river bank.



"TICK-TACK," THE BELATED BABY, AFTER HE BECAME A PET

CHAPTER TWELVE

THOROUGHbred POULTRY

THOUGH the first fifteen hens I bought were just nondescripts, I intended to have good birds eventually, so the plebeians' eggs were used for the table, and then when the old ladies evinced a desire to set, eggs were brought from a poultry farm which kept white Wyandottes. Only common market stock, but that was all the exchequer could afford in those days, and by buying cockerels of higher caste to head the breeding-pens, the young birds were a little better each year.

In the spring of the fourth year the desire for show-room trophies, and the prestige their possession gives, became irresistible, and a trio of birds who had won first prize at Madison Square Garden, in New York City, were purchased for \$70. It seemed an awful price for

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three birds, and I felt guilty until results justified the extravagance.

The birds were bought in February, and the following October their account stood as follows: The ten best cockerels sold at \$5 each; four equally good pullets at \$2.50 each; thirty-two cockerels not so good in points, an average of \$1.50 each; twenty pullets of the same grade, valued at \$1 each, added to our own laying stock; fifteen really first-class pullets kept for breeding stock, making in all the cash return of \$76. Value of stock kept, \$32.50; making a sum total of \$108.50. Deducting \$8.50 for feed and the original outlay of \$70, we netted a profit of \$30 in nine months.

Rearing prize birds or animals is one of the most profitable and interesting branches of husbandry. But it should not be attempted until experience has furnished solid practical knowledge and time has established a good market.

Inquiries for thoroughbred stock had

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been numerous for at least a year before I had any for sale. So the first year there was no occasion even to advertise. An article written by A. A. Brigham for the *Young Poultryman* of Rhode Island in 1899 was so helpful to me that I asked for and received permission to quote it at length:

"INBREEDING

" 'Breeding in and in' is a term which signifies the breeding together of animals of close consanguinity, but the closeness of blood relationship is not defined. The idea is to fix and concentrate any desirable quality by breeding together closely related animals possessing that quality. It is always easier to find one or two animals possessing the desired character in a marked degree than to find a whole flock possessing the same quality, *e. g.*, every pen of fowls has its 'best bird.'

"If, then, we would seek to develop a family, flock, or breed possessing the proper-

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ties desired, we can most quickly secure this object by interbreeding the few individuals possessing the properties, with their offspring which have inherited the same qualities.

“Carefully and intelligently prosecuted, this process may result successfully. Ignorantly or injudiciously carried on, the result will probably be disastrous. It is a principle in stock-breeding that coupling two animals possessing the same good quality, defect, or disease, will tend to fix and intensify that good quality, defect or disease in the offspring.

“Two essential conditions must invariably attend successful inbreeding, viz., sound constitution and perfect health. With these as a foundation, close inbreeding may be practised with the best of results, as is shown by the breeds thus produced and perpetuated by successful stock-breeders.

“The qualities of fattening easily and quickly, of early maturity, of enormous egg production, all have been brought to highest perfection in individuals and families which



WHITE WYANDOTTE ROOSTER

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have resulted from close inbreeding. Mr. Bates' rule in cattle breeding was, 'Always put the best animals together regardless of any affinity in blood.' One of the most valuable practical advantages of careful interbreeding is in the imparting of the quality of prepotency to males. The thoroughbred stallion, bull or cock-bird is bred to many females of his kind, and thus greatly influences the quality of numerous offspring on the farm or in the neighborhood where he is kept. A male which has inherited the concentrated virtues of a long line of interbred ancestors will stamp those qualities most certainly upon his offspring.

"Cross breeding as a farm practice may be defined as breeding together animals of different breeds or families.

"Cross breeding is of vast importance in improving the wool, muscles, meat, milk, eggs, or other marketable product of common or native stock. The common animals generally have good constitution and good health, but are

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often inferior in their yield of valuable market products. The pure-bred animal, possessing the qualities desired and the power of strongly and surely transmitting them, is crossed upon the common stock, and the result is usually great improvement. The prepotency of the pure-bred animal gives him power of affecting the qualities of the offspring to far greater extent than his mate.

“ Note how rapidly the pure blood increases if in the process the offspring of each generation are bred with pure bloods each time.

The first cross	has	$\frac{1}{2}$	pure blood.
“ second	“	$\frac{3}{4}$	“ “
“ third	“	$\frac{7}{8}$	“ “
“ seventh	“	$\frac{127}{128}$	“ “

“ With the second cross comes the question of interbreeding, *i.e.*, the breeder must decide whether he will breed the daughter to her sire, or make use of another male of the same breed as the sire.

“ When by crossing with superior animals we

THE EARTH'S BOUNTY.

have improved our stock, we must also provide improved conditions. The climate, the food, and the care must all be as good as the superior pure-bred animals have previously enjoyed, else the improvement cannot be maintained.

“In nature changes come slowly. It may be necessary to secure the desired changes by gradual steps. If the animals to be crossed are too disproportionate to each other, ‘reversion’ will very probably occur and bring disappointment. ‘Violent crosses’ are, therefore, to be avoided. Do not attempt to cross animals of distinct breeds having opposite characters. Never cross-breed animals simply for the sake of crossing.

“Breeding between crosses is merely guesswork and yields haphazard results, because usually crosses have not fixed hereditary characteristics. How fast the pure blood may become diluted by crossing out and out is shown by the fact that in the tenth generation the descendant would possess only one-ten-hun-

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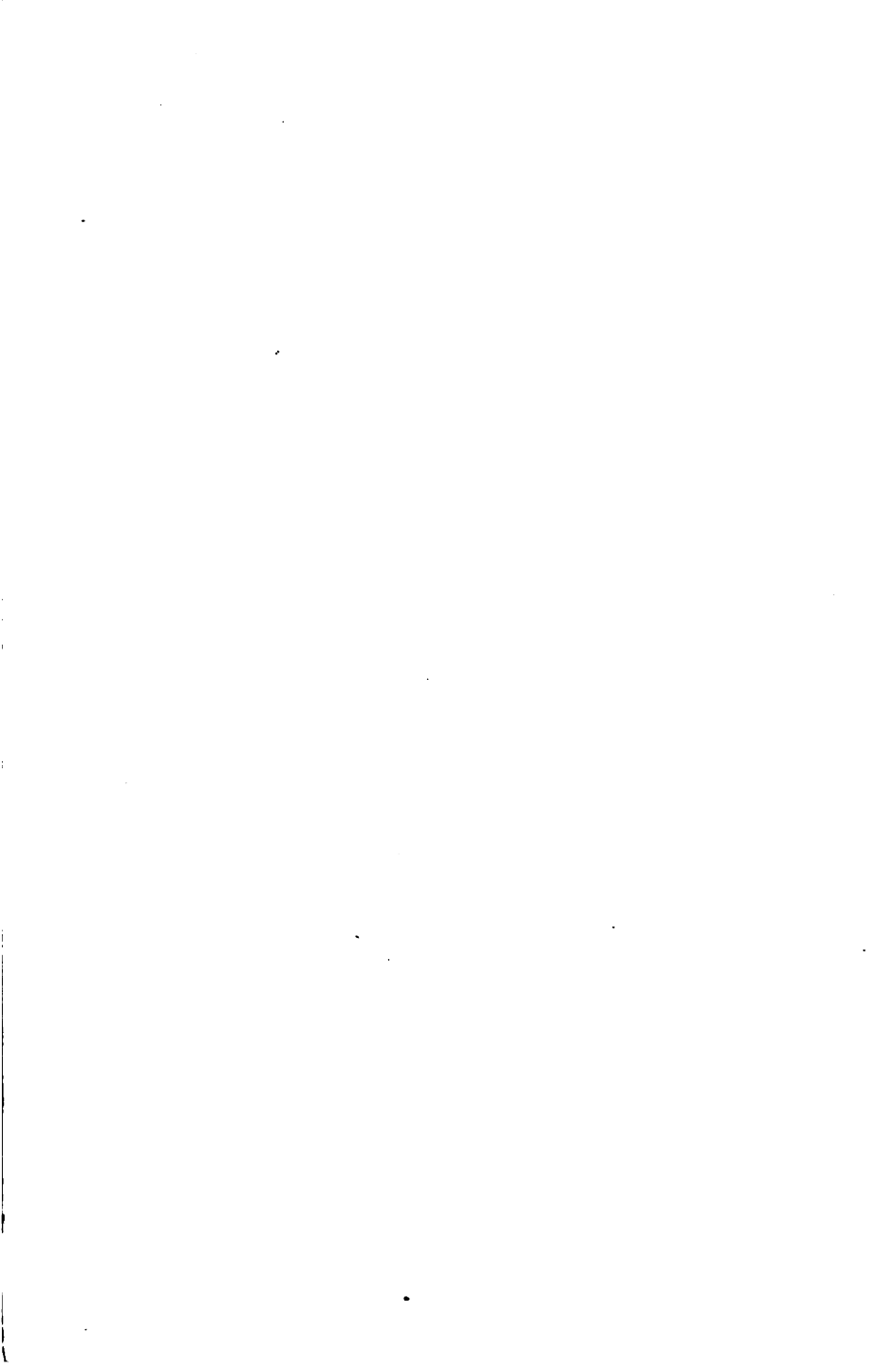
dred-twenty-fourth part of the original pure-bred ancestor.

“However desirable it would seem to be able to determine what qualities the father and mother each transmit to their offspring, the conditions of breeding are so complex and intricate that it is very difficult to establish proof of any theory as to this subject.

“We are safe in asserting that the parent which has the greatest prepotency and an ancestry bred for the longest time, in a certain line, will most strongly affect the progeny.

“We may sometimes overcome the transmission of a defect or blemish of one parent by coupling with such animal a mate possessing very prepotent excellency in the point where the other is deficient.

“It seems to be not so much a question of sex as of individuality. We may hence learn what individual parents can do, and by careful use of that knowledge, and with close regard for accompanying conditions, bring about desirable or avoid undesirable results.





WHITE WYANDOTTE HEN

THE EARTH'S BOUNTY

The relative influence of parents is further affected by purity of blood, by constitution, and by physical vigor. The age of a parent may thus have much to do with the question. Lack of bodily exercise may tend to lessen the proportion of influence. Excessive use in breeding will cause diminution of power to transmit qualities.

" PEDIGREE

" From the study we have made of the principles of breeding we must conclude that the ancestry of our breeding animals is of very great significance in determining results. The development of the best breeds of farm stock has been in very striking degree the fixing of the desirable and prepotent characters of a few ancestors upon numerous descendants.

" The pedigree of an animal is his line of descent, his list of progenitors; in short, his *ancestry*. In stock-breeding, the term is often applied to signify the statement on record of

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the ancestry of an animal. An animal's pedigree may be good or bad, according to the worth or worthlessness of the ancestors included in it. It may be complete or incomplete, according as it includes all or only a part of the names of the individuals composing the animal's ancestry back to the formation of the breed.

“The perfectly prepared pedigree of an animal shows the foundation stock of the breed that enters into his line of ancestry, and then step by step exhibits the different links in the chain of life, indicating to what extent the foundation stock and their progeny re-enter the pedigree, the closeness of interbreeding, the out breeding, the use of unknown, doubtful, or undesirable sires or dams; in fact, all the blood-relationships of which the animal is the result.

“With the pedigree should be studied the records, so far as obtainable, of the animals listed in the pedigree. In actual investigation of the ancestries of animals, it is almost and

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oftentimes quite impossible to ascertain the whole of the ancestral history of a given individual, owing to the incompleteness of the records of the past; only those animals which have developed peculiarly strong and valuable characteristics having been considered worthy of (historical) recording. Especially is this true in poultry breeding.

“This subject of pedigree is a most emphatic illustration of the importance of the principles of heredity. It may serve to explain atavism, showing to what ancestor an offspring has reverted. It emphasizes the value of prepotency; since it often serves to show how the prepotent power of an ancient ancestor has stamped his descendants, even to the extent of a whole breed, with his qualities. It may further show the power of pure blood or of a cross in causing variation, or negatively exhibit the effects of unfavorable conditions in overcoming inheritable qualities (comparing expected and realized results).

“The breeder should very thoroughly study

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his breeding animals as individuals, and by the senses of sight and touch learn to judge of their qualities, and especially to associate the visible form and the feeling of the conspicuous parts with correlated unrevealed qualities.

“ We all like to see what we call beauty and symmetry in our fowls and other farm animals, but the practical breeder should learn to understand what form of symmetry is best adapted to and associated with the purpose which he has in view. A study of the characters of different distinct breeds of farm animals shows us that different forms and characteristics attend upon varied qualities and powers, and that certain forms, colors and proportions become so well fixed that a bird that does not strongly resemble the true type of its breed is rejected from the breeder's list of breeding stock. The breeder having ascertained as much as possible by the study of his animal's ancestry through pedigrees and records, next seeks to understand further qualities by the study of individual conformations

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and characteristics; and finally, as opportunity offers, studies his breeding animals by their own records and by their offspring, thus coming in due time to know his animals most completely."

The beginner is usually convinced that two perfect-looking creatures of any sort or kind will produce their like, but unfortunately such is not the case. A bird's ancestors have almost more influence on its progeny than the individuality of the bird itself. For that reason it is necessary to know the characteristics of the ancestral progenitors of the bird that you desire to cultivate, so that the signs of reverted heredity can be recognized at once, and intelligently combated by the next season's mating.

As Plymouth Rocks were the first American creation in poultry to achieve any public recognition, we will consider them first.

Years and years ago there was in New England a common fowl, often referred to in early poultry literature as "the hawk-colored hen." The birds are gray, with rather red wings and

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many black feathers. It is said that they were even faintly, but indistinctly, barred on neck and saddle. They had single combs and clear shanks, and often weighed from five to six pounds. A few progressive farmers, wishing to improve the laying quality of their hens, following the old-time theory of like begetting like, selected the best birds at their disposal and mated them, and in time their descendants became known as the "Dominick fowls"; an improvement on the old hawk-colored bird, but still not satisfactory to this group of utilitarians. Brahmas, Cochins and Langshans, which were at that time being imported to a limited extent, were too slow and heavy to fill their ideal; Leghorns and Minorcas too light, excitable and difficult to control within a limited space. Besides, the cold New England winters were not conducive to the Mediterranean birds' productiveness. So a Mr. Clark, who had some black Cochins, which had been imported by a Mr. Giles, and a Mr. Spalding who kept the hawk-colored fowls,

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tried the effect of mating Cochin pullets with a hawk rooster. The results were cockerels resembling the sire, but with more visible black markings. Pullets were principally black, only a very few resembling the male bird, and even these much darker in color than the sire. This mating was (on the authority of veteran poultrymen like D. A. Upham of Wilsonville, Conn., and the Rev. D. D. Bishop) the foundation of the first American breed of fowls. Mr. Upham procured two of the lighter pullets and a cockerel, and for two or three years he strove to improve the markings and general type; then in 1869 showed them at Worcester, Mass., under the name of Plymouth Rocks—a name which Dr. Bennett of Plymouth, Mass., had given to some birds which he had manufactured prior to 1850, by crossing Cochin China, Dorkings, Malays, and Wild Indian. According to report, these birds were not at all like the present Rocks, and were, in 1869, extinct, so Mr. Upham was at liberty to adopt the name without trenching

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upon anyone's prerogative. The birds shown by Mr. Upham created quite a sensation, not only from their appropriate size for table use and laying qualities, but for being the first real American creation they aroused and gratified national pride, and every fancier tried to buy birds or eggs. Some wiseacres, guessing how the new breed had been created, set about developing strains of their own. Some used Brahmas, others Cochins, to gain size. Even now, one occasionally hears of the Ramsdell, Gilman, Essex, and May strains of Barred Plymouth Rocks. The amateur who tried to breed Plymouth Rocks twenty years ago had to fight the legacies bestowed by the original mixed ancestry. Sometimes it would be the feathered legs of the Cochin; sometimes the black coloring or red feathers and poor breeding of the old-time hawk bird. Years of careful breeding have almost entirely eliminated such troubles in up-to-date stock. But allow a flock of originally good birds to mate indiscriminately for three or



PLYMOUTH ROCK ROOSTER

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four seasons, and they will gradually lose their special Rock individuality, and reproduce in bleared form many traits of the birds from which they sprung. To militate such tendencies and keep up the standard, the amateur must be thoroughly familiar with the form and color of the ideal Barred Plymouth Rock type. The body should be deep, yet well rounded, the neck and tail curving upward from the back, which is broad and of medium length. Body, deep, broad and full; thighs, large and of medium length; shanks, stout and smooth; well-apart and of medium length. Head, medium, carried high. Adult males should weigh $9\frac{1}{2}$ pounds; cockerels, 8 pounds; hens, $7\frac{1}{2}$; pullets, $6\frac{1}{2}$. Color: beak, shanks and feet yellow. Females sometimes have a few slight dark stripes at the base of the bill, which are not essential, but are not counted as blemishes. Eyes, deep bay; face, comb, wattles and ear-lobes, bright red. General carriage should be alert, trig and business-like.

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Now for the most exacting and difficult item—plumage. The standard of perfection described it up to 1903 as bluish-gray, with narrow parallel lines of dark blue, just stopping short of positive black. In the later issues it has been changed to grayish-white, each feather crossed by regular, narrow, parallel, sharply-defined dark bars, that stop short of positive black, free from shafting of brownish tinge or metallic sheen. The light and dark bars to be of nearly equal width, and to extend throughout the length of the feather in all sections of the fowl. (On females, feathers having narrow, dark tips are preferred.) The combination of overlapping feathers to give the plumage a bluish appearance. F. L. Sewell, a poultry artist of acknowledged authority, in a very extensive discussion of the color of the Barred Plymouth Rocks says:

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“PARALLEL BARS SHOULD BE AS STRAIGHT AS POSSIBLE”

While the *Standard* fails to say anything about the straightness of the bars, it does describe them as “parallel.” This feature, combined with their being as straight as possible, gives the most attractive effect and helps a great deal toward the feathers matching their bars side by side in rings, round the body of the bird. On the pencilled Hamburg, the bars have been bred to the straightest pattern of any variety of fowls, and they are famous for their “ringy” effect. We have seen birds so marked where the bars bent backward and also males in which the bars of the surface color bent forward towards the tip, that were severely criticised by experts. Mr. Arthur Smith, of Grove Hill Poultry Yards, has often called our attention in the show rooms to this failure in quite evenly-colored birds, that otherwise were attractive, but did

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not prove "ringy" on account of the V-shape marking.

The bars on the opposite sides of the quill not matching, but breaking at the quill, is an old, persistent habit of the "cookoo" or Dominique color, which in some poorly-bred specimens repeats itself nearly all over the bird. With all the good specimens to be found at our best breeders' yards at the present, this blemish, when found throughout the plumage, stamps the individual as a very cheap bird. While we are mentioning the common faults and cheapness of this irregularity of marking, we would not wish to convey to the mind of any novice the idea that perfectly barred specimens are obtainable. The first prize New York hen, shown last winter (December, 1907), by Chas. H. Welles, probably came as near to perfection in color as has ever been shown in America, and an offer even of \$1,000 did not tempt him to part with her, but he preferred rather to keep her for breeding.

The "shaft" or quill must be the same color



A RHODE ISLAND RED ROOSTER

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as the bar through which it passes. The *Standard* says "free from shafting." This means free from light-colored quill passing through the dark bars. The shaft occasionally shows dark color in the light bar, but this is seldom the case with this breed, and is little thought of, as an over-colored feather is seldom regarded so faulty as one lacking in color. Even a black, blotched feather is not considered so serious a blemish as one blotched with white. The over-colored blood is more easily corrected than blood that lacks, as blood that lacks pigment cannot be impressed with pattern in its color so readily.

THE COLOR OF THE TIP

Until the latest revision of the standard of perfection, no mention was made of color of tip in either Dominiques, Plymouth Rocks, or Dominique Leghorns. This point, which has so much to do with the general effect and surface color, has for several years past re-

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ceived considerable attention, and at our best shows has been critically judged. Strange to say, in the latest edition of the *Standard* no mention of preference for this finishing touch on males is made; only is it described for females. Truly it would be a poor mating that did not match in this respect.

Early in the '90s particular attention was called to the very pleasing effect of continuous bands of color caused by the straight bars of the best-bred birds, matching in such a way as to produce the effect of rings of color around the body or across portions of sections.

The attempt to produce this "ringy" effect upon as many sections as possible, since it became the fashion, has proven not only fascinating to breeder and fancier, but is establishing a trade mark upon the highest standard-bred exhibition barred Plymouth Rocks that are of more than common value for fine show birds.

Until recent years male birds have been much lighter than pullets. Now the ambition

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of the club is to have males and pullets match as nearly as possible, and experienced breeders discovered long ago that to accomplish this feat it was necessary to keep two distinct families, each specially mated, to produce males and females.

When I commenced to read up on the subject, "line-breeding" and "double mating" were my stumbling-blocks. I read dozens of articles in different poultry papers before I was able to grasp the true meaning of either. Two perfect birds who match and have won first prize in a show room will, if mated, invariably produce light or dark birds, and as invariably will the indiscriminate mating of two distinct blood lines of barred varieties produce blurred or imperfect markings. So the only way to get exhibition birds is to mate standard-color males to slightly darker females who were sired by the same father. In other words, mating a bird to his half-sister, of a slightly darker color than himself, and the male progeny will

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almost surely resemble the father, while the females will be like the mother, strongly-marked birds—but too dark for show-room requirements. For blue ribbon females, standard-color pullets must be chosen and mated with a male of lighter color, belonging to the mother's family—father or brother or son—it is immaterial so long as relationship is on the maternal side. You will probably say, "Why, that is inbreeding," which, of course, it is; but as only the best-shaped and generally perfect specimens are chosen for such propagating, it is not likely to cause any trouble. Periodically it is well to procure a cockerel from some branch of the same family, which has been outbred, and make an experimental mating with one or two pullets. If the progeny of either sex are good, keep them, and infuse new blood into the breeding pens, but always remember to keep the matings to standard color on the sire's line for males, and the mother's line for females. And also remember that shape and vigor are as important as

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plumage. Though I started my thoroughbred pens with prize birds, I had quite a difficult fight to get the bars to run straight across the feathers. They were good to the tips, but there they either mixed on the black line or conformed to the round of the feather. After two seasons I sent to the person from whom I bought the original trio for a very dark cockerel from the same females and mated him with quite light pullets. The first season I succeeded in getting two cockerels out of the chicks reared, which had perfectly straight bars and were all right in general color. The following season straight bars predominated, and the one show bird we reared amply repaid us for all the trouble and time.

From barred Rocks I skipped to buff varieties, Cochins and Wyandottes, trying both the same season, and fortunately for the prosperity of the farm, I discovered that it was a mistake to try all sorts and kinds of birds, and returned to my original love for the white Wyandotte, from which I have never since de-

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viated; so the following hints on buff matings are mostly gleaned from other people's experience and condensed as follows:

Study the male birds first: select the very best you can get, then carefully note each point and compare them with the demands of the standard. The best bird will be lacking in some respects, so choose the pullets to counterbalance his weaknesses. Should he be too large, have too large a comb, legs too long, or some other point of formation over-accentuated, let the pullets be correspondingly weak in that special point. Don't lose sight of the fact that type should come first in selection. Time and judicious mating will eventually correct color faults. In the case of Wyandotte males the most generally seen defects are these:

Too high on legs; too long on back; narrowness across the saddle, giving a pinched appearance to base of tail; wings carried too high; perhaps at an acute angle to the back, thus preventing the graceful concave sweep to the tail that should mark the Wyandotte; un-

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shapely comb; unsound lobes; light-colored eye, etc. No one would think of using a bird having all these defects; but the great majority of males have some of them in greater or less degree. A male may be splendid in shape in some sections and lacking badly in others. This lack must be compensated for in the female. If he is high on legs, select for him females low on shanks; if he is narrow across the back, mate him to a hen with quite an apparent cushion. Aim at low-set, blocky chickens, and bear in mind that if you mate two birds with the same shape defect you will only aggravate and increase that defect in a large percentage of their chicks.

In the show-room, buff really means buff, not red; but it must be buff down to the skin, and of one uniform shade. The common color defects are red on neck or near the tail, light shading across the middle of the back; black or white feathers in tail or wing; white or pale under color. (Under color means the top of the feather which lies near the skin, not,

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as I used to think, the feathers on the under part of the bird's body.) Until a buff bird has matured one really cannot tell what the bird's color is going to be. You must always wait until the birds have had the first moult, and get their adult feathers. White birds must be mated with the same regard for counterbalancing defects of shape and color as other varieties. The greatest difficulty is to get and maintain white plumage: the natural tendency is to brassiness.

From the time chicks are hatched, they should receive the best of care in the matter of food, for any neglect will check growth, and jeopardize their chances later in life. In the "Self-Supporting Home" I gave a method of washing and shipping birds, but as you may not have read it, the instruction given in the catalogue of one of the largest white Wyandotte breeders in the world may help you.

Have ready three tubs of water; one hot, one warm, and one cold. To the latter add ordinary washing blue. Get a moderately soft



BUFF ROCK PULLET



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sponge, a cake of ivory soap, and a Turkish towel; all in a clean room where a good fire is burning.

Put the bird into the hot water, start at the head, and scrub clean, using the brush always downwards, never across or upwards. Use plenty of soap and do the work thoroughly. Scrub the shanks and toes, move to the second tub, and rinse and rinse until not a vestige of soap remains in the feathers. Next dip up and down several times in the bluing water. Hold it up and shake off all the water you can, then wipe thoroughly with the sponge, and place in a small coop near the fire, but not too close, as a direct heat will cause the feathers to crinkle and crawl. Cover the bottom of the coop with a layer of sawdust not less than two inches deep, to insure the droppings being immediately covered.

CHAPTER THIRTEEN

DOGS

A COUNTRY home must have its dog or dogs, and the self-supporting scheme demands that good specimens of a popular breed be selected to insure the progeny being of marketable value. The Master Man and I had been dog lovers all our lives; many and many a sacrifice had we been called upon to make in the days of travel. There are so many hotels and places that can't be cheated or bribed into accepting four-footed guests.

We had been dogless for about a year when we moved on to the farm, so when I nearly ran over a puppy in the road when out driving one day and was attracted by the solemn, dignified manner in which he trotted back to the house which he should *not* have left, I was delighted to be able to purchase him for two dollars.

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He was just dog, his mother being mainly Irish setter, and his father Scotch collie, but he was intelligent, and developed into the head herdsman of the farm. We only had him a few weeks when Jack joined the family.

One evening there was a heavy thunderstorm that made going to bed a useless proceeding, so I sat reading in the living-room, though it was quite late, when suddenly a huge black object dashed through the open window, cleared the table at a bound, and positively hurled itself across my knee.

Truly, I do not think I ever experienced such a horrible, uncanny fright, but instinct cautioned me to keep quiet and speak soothingly, though I don't think I realized for a few seconds that it was just a dog, and even when I did, his violent entrance and condition were not reassuring.

He continued to moan and crouch just where he had first landed, with his head buried in my knee, for what seemed an age, but as his paroxysm of terror subsided I man-

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aged to slip his heavy body on to the floor. He seemed utterly exhausted—his wild eyes and half-open mouth made me move very cautiously. I reached for a dish of bread and milk which had been brought in for the cat, and pushed it close to his nose. He made an effort to grab at it, but instead of eating fell back moaning.

After a little while, I screwed up my courage to drop a small piece of the moist bread into his mouth, and as I stroked his head to try and coax him to eat, my hand came in contact with what I thought was a thick string around his throat, which was evidently strangling him. Getting it off was a dreadful business, for his throat had swollen, and instead of a rope, it proved to be the lash of a rawhide whip. The pressure necessary to cut it, and the gash I could not help making in his skin, must have been agonizing, yet the first thing the poor beast did was to try and lick my hand. When I had time to notice details, I was horrified to find that his shoulders and breast were soaked with blood,

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and that my dress had ghastly stains all down the front. Examination showed that his front paws were torn and bleeding, but there was no cut or wound to account for the condition of his coat.

Imagination conjured up such scenes of tragedy that I just had to play nurse all night because I was too great a coward to go to bed.

Jack—as we called him, because he answered to it when I ran through a list of ordinary dog names—was an invalid for many weeks, but when he commenced to recover and fill out, he developed into a most ferocious-looking giant, and as strong as a lion. Rover he adopted as a son, and educated him splendidly. That they had a code of communion, and worked in accordance with Jack's orders in guarding the place, was clearly demonstrated on many occasions. If anything suspicious happened at night, Rover would come to the window of my room, stand up on his hind legs, put his nose to the sash—which was always

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open, summer or winter—and after two or three soft cries, repeating them at short intervals until I got up and spoke to him, he would at once go to the side door and wait to guide me to where the trouble was, and there we always found Jack on guard. This had been repeated several times, and always in the same way. Once the brooder-house caught fire, and but for their timely warning the loss would have been ruinous.

So when I was aroused one night when the Master Man was away from home, I hurried out without waiting to awaken Sidney. Instead of the brooder-house, as I feared, Rover piloted me to the pheasantry. It was a cloudy night, and the light uncertain, so I didn't see Jack, but ran against him, and felt that he was rigid and half-crouching, ready to spring. At the same time I made out three figures within the enclosure.

Just what happened next I don't know. The light must have improved, for I saw the men plainly, and they evidently saw us. Sev-

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eral shots were fired; one of the men tried to seize me; Jack flew at his throat, and they both fell to the ground. There was an awful confusion of curses, shots, and entreaties to call the dog off, amidst which I heard distinctly, "I'll be killed! It's Rawlings' d——n brute!" "Shut up, you fool, we killed him!" "It's him! Come on!"

The two men, still on their feet, seemed frightened, and Jack's man yelled madly and imploringly to me to call off the "—— ——— Rawlings dog," promising to go if I would. Well, I did, fearing for the dogs, but for the first time Jack was slow to obey, and when he did, it was only for a second or two, then he flew after the rushing figures, which fled across the orchard to a rig which stood in the road. There was another battle between the dogs and the men, who eventually succeeded in getting off just as Sidney and Mr. Fred, who had been awakened by the shots and cries, arrived on the scene.

Poor Rover was shot in the throat, and

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never fully recovered, dying from the effects of the wound before the year was out. Jack had escaped any bullets. Both dogs were smeared with blood, so we concluded the men had suffered.

From the remarks about Rawlings' dog, and the men's evident fright when they recognized Jack as an old acquaintance, we were led to believe that had we been able to trace the men, we might have unearthed the mystery of the tragedy that brought Jack to us.

Some weeks after the attempted robbery I noticed Jack putting up his head, sniffing and growling several times during the early part of the day. Later he was missing.

About nine o'clock he crawled into my work-room, dragging his hind quarters helplessly along; he had been shot in the back. There were a few minutes of content, having reached me—then the end came. Like his coming, his leaving us was fraught with pain and misery.

I have wandered far from the practical, but Jack and Rover were such noble examples of



"VICTORIA"

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the faithful devotion of what people call common dogs, that I could not refrain from telling their stories, to make it perfectly clear to every one that when I advocate thoroughbred dogs, it is solely for commercial reasons, and not in any disparagement of "just dog," yellow or any other color, for no aristocrat, however blue its blood, could have usurped Jack's and Rover's places in our affection.

Great Danes are the best dogs to be kept from mercenary motives. Our genii brought them to us, though by common ordinary channels. Pigs had to be killed, and a butcher was engaged to come and do the gory work. I suppose some one had been talking about dear old Jack's death, for the man asked to see me, and said that he had two big dogs, which he had taken to board some time before, and as no one had come to pay their bills, he could not afford to keep them any longer; he would be glad to let me have them for \$5 a piece. Finding that he knew nothing about the owner's whereabouts, I agreed to take them on

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the condition that should any one claim them, he would refer them to me.

I expected just two big dogs that would do for watchmen around the building, so my astonishment was great when Victor and Victoria arrived. They were perfectly well-broken, well-behaved dogs, and what was much more to their credit, evinced a desire to be friendly with the cats. We soon realized that Victoria required special care and attention. Being rather nervous about the possible difficulties which might arise, Mr. Fred was sent to the city to confer with a canine doctor, whose cautions and suggestions were so many and alarming that we decided to send Victoria up to his place for a time.

But it was another case of "man proposes"—two days later she refused to leave the box stall in which it had seemed best to keep her at night. Her eyes showed signs of trouble, and she declined the ordinary breakfast, so some warm milk was fetched, and she was coaxed into drinking it.

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By nine o'clock in the evening she was resting comfortably, with nine babies to joy her motherly heart. Next morning Mr. Fred was sent scouring the country for one or more foster-mothers. Nothing of a suitable kind could be found, so we decided to resort once again to bottles and goat's milk, but Victoria seemed so disgusted with our interference that we concluded to let her keep them all, for a time at least. Of course she was given all she would eat—chopped raw beef, soup, and whole wheat bread and milk, and the babies were taught to lap goat's milk as soon as it was possible: Victor was very proud of his children, and helped to look after them beautifully as soon as they commenced to stagger about.

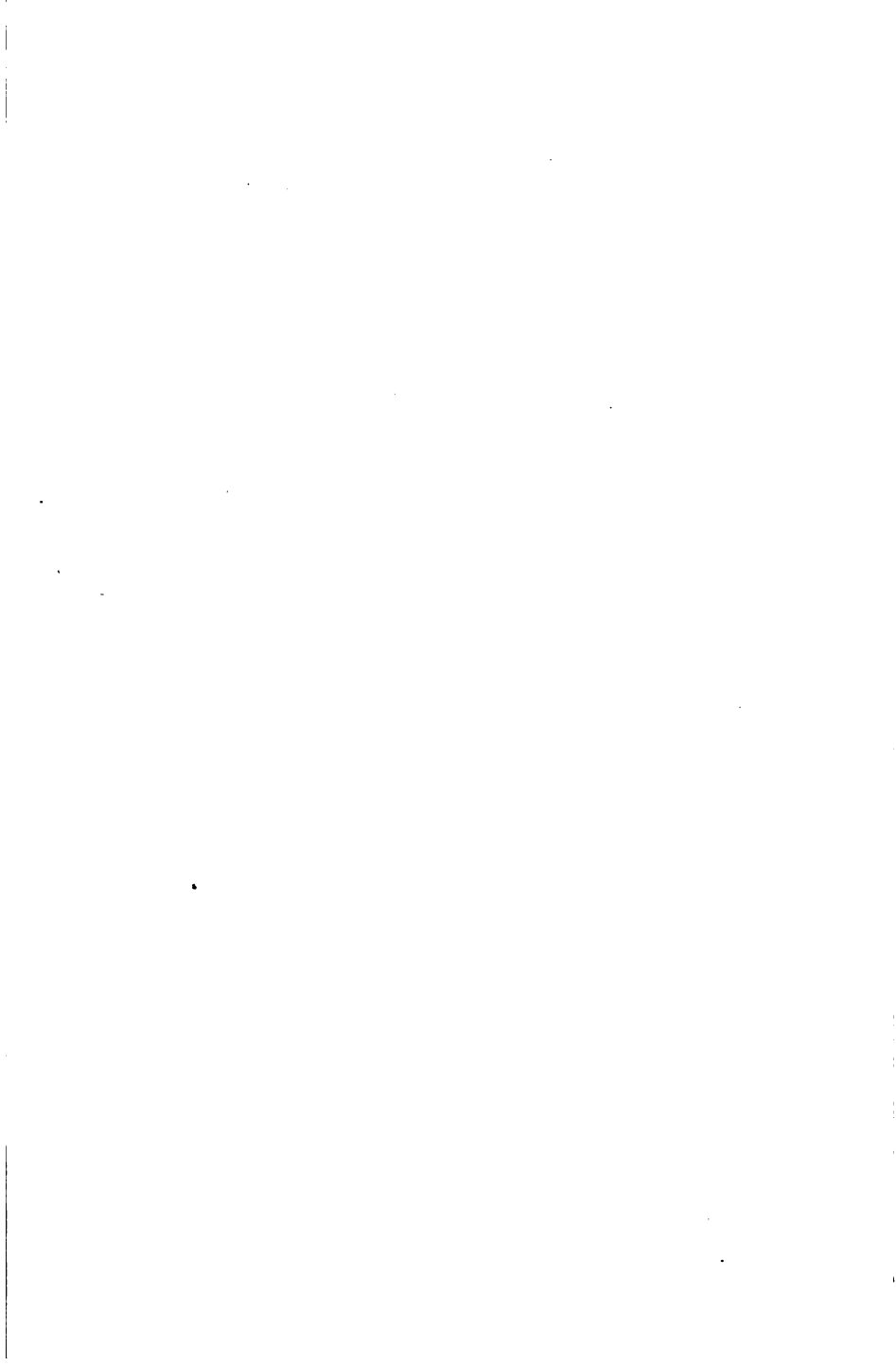
As we didn't know the dogs' pedigrees, nor anything of their ancestry, they could only be sold on their face value. The two largest and best-shaped males brought \$50 each when nine months old; the three others \$25 each. The females were got rid of when they were between three and four months old, and they

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brought \$5 each. We looked up the butcher and paid their board bill of \$60. It did not seem fair to let him lose when we had gained so much by the transaction.

The food of two large dogs like the Danes will not cost more than a dollar a week on a farm, and that, of course, is only \$52 a year. From birth, and until a year old, a puppy might cost about \$20; but it is safe to estimate that one good puppy will pay his own and his parents' expenses, so the remainder can be counted as clear profit. As with all pet stock, fashion sets the price; so in establishing kennels, or even in selecting a guardian for the home, choose the dog or dogs in vogue.

Just now the collie is pre-eminently the wealthy woman's favorite among large breeds, and there is little fear of his being deposed, for his handsome coat and gentle, mannerly ways render Mr. Collie an acquisition to a carriage, to say nothing of his growing popularity among the big cattle raisers of the





A GOOD COLLIE

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West, who are rapidly learning to value the collie as an aid in herding.

A more recent claimant for notice is the stately Russian wolf-hound. Of course hunting dogs hold their own regardless of fashion's ebb and flow, but before attempting to establish such a kennel, the ability to "break to gun" must be considered.

Amongst smaller dogs, Cocker spaniels, Airedale terriers, Irish and Scotch terriers, seem to lead; while the toy favorites are Ruby spaniels, Blenheims, Pomeranians, King Charles and Japanese spaniels, and just lately Yorkshire terriers—all dear, fascinating little fellows, that any woman can raise even in a city home.

GENERAL CARE

The first consideration is to understand the care necessary to keep a dog in health; next, the patience to teach him at least rudimentary manners and deportment, for all puppies

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should be cleanly and biddable before being sent away to strangers, who may know little about dogs, and so imagine starving or thrashing the only cure for cries of lonely misery or mistakes caused by nervousness.

A mature female collie, in whelp, will cost from \$50 to \$100: other breeds no less, and in many cases, like the Russian wolf-hound, much more. The bluest of blue-blooded pups usually range from \$10 to \$25. A few months, and the female can go to service to some good stud dog, and before long there will be young ones for sale, which will repay all the outlay, and render future progeny entire profit.

Have a comfortable kennel ready before sending for the dog. It can be made out of a drygoods case covered with roofing paper if the family talents do not include carpentering. No matter what the architecture may be, let it be free from damp and drafts, and stand where sheltered from summer suns and winter winds. Provide an ample bed for cold nights, to be renewed twice a week; a chain at least

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twenty feet long, with strong swivels at each end, and a screw-eye at the side of the kennel to snap it to. The advantage of having a swivel at each end of the chain is manifold; the chain won't become tangled to half its length, and can be moved without trouble if occasion arises for a temporary change of place.

When a dog arrives, if it has been crated and sent by express, remember that in all probability the poor beastie will be frightened, tired and cross; so be gentle and considerate. Talk to it in a gentle and friendly way, and manage to place a collar around its neck and snap the chain to it before opening the crate. Let the dog get out by himself—don't pull or drag him. You have got to *win* his confidence before asserting your authority. Devote half an hour or so to walking him about, or rather letting him walk you about. Naturally cleanly dogs will need the exercise. If there are signs of constipation, don't attempt to dose the stranger. A piece of fat meat or some sour

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milk will usually correct the trouble. If, however, the journey has had the reverse effect, feed bread and milk which has been scalded, or boiled rice.

When a reasonable inspection of the premises has been made, fasten the dog to the kennel, feed little, place a dish of clean water within reach, and leave him alone to realize the change of home, and possibly sleep off the nervous strain of the journey. Should he whine, or even howl, do not go out to him. The fight has to be gone through with most dogs, and it is of shorter duration if accomplished immediately on arrival in a strange place. Feed him yourself, and take him out for a run on chain, in the morning, at noon, again at night, for two days; after this the average dog will acknowledge you as master or mistress, as the case may be, and the kennel as his castle.

If it is a young dog, the discipline of being chained at night is beneficial, preventing, as it does, the natural tendency of half-grown

THE EARTH'S BOUNTY

puppies to go off after birds or rabbits in the early morning hours; but no dog should be kept perpetually on chain. The guarding companionship which has made the canine race man's best friend, cannot exist unless the dog has freedom of action to follow and protect. Moreover, they are active animals, whose health suffers if condemned to a life of semi-inactivity.

A city woman who heard of me through a mutual friend, wrote and asked me to accept a pair of pedigreed fox-terriers, as she was going abroad. I was delighted until two miserable, shivery, silky-haired, overfed creatures arrived, wearing thick blankets and boots. My disgust almost made me dislike the poor little wretches. As it was, my indignation vented itself in burning the boots.

Pity for the victims of a silly woman's mistaken kindness prompted trying to revive any spark of terrier left in them—not a very easy matter, as I found. They shivered, shook, and howled for their blankets at night, and had to

THE EARTH'S BOUNTY

be starved into eating wholesome food, as their diet had consisted of hard-boiled eggs, chicken, cream, and sponge cake. Can any reasonable being imagine any self-respecting fox-terrier submitting to being clothed, shod, and fed on such food?

I have always regretted that we did not have photographs taken on arrival and six months later; they would have been such convincing proofs of the value of proper food and exercise; for within that time the overfed bodies became symmetrical, dull listlessness gave place to alert activity, silky hair scattered to the four winds of heaven, and the wiry coat which Beaker and Babber's ancestors entitled them to gradually asserted itself, making us as proud of our small doggies as we were of our large ones.

I have described the condition of these two dogs and their subsequent return to normal conditions simply to warn the solicitous against overfeeding and pampering, which is quite as cruel as neglect. Large dogs, and the terrier

THE EARTH'S BOUNTY

class, must have quantities of out-door exercise and wholesome food to be healthy.

When a puppy is being weaned, from the fifth to the eighth week, feed five times a day—small quantities, of course, for the stomach must not be overtaxed. Bread and milk, boiled oatmeal, hominy, or any such food is suitable for breakfast. A cracker, or half a slice of brown bread, is good for lunches. The main meal should consist of boiled meat, onions and rice, mixed with some cooked, green vegetable.

From ten weeks old until nine months, three meals a day. Two meals are sufficient for mature dogs. The best way to gauge quantity is to find out about what a dog will eat, and then give a little less. Puppies or dogs should be eager for food, but not ravenous. Don't give milk which has not been scalded, or potatoes in any form, if you wish to save the puppies from worms. Sour milk once or twice a week in summer is healthful, but should not be given oftener.

Twice a week a bone with some meat on it is

THE EARTH'S BOUNTY

needed. There is a theory that raw meat is injurious for dogs, but I know several experienced breeders who affirm that a limited quantity of lean, raw beef is positively essential for growing puppies, and, of course, everybody knows that a bone keeps a dog's teeth in order, but what many people do not know is that the brittle bones of poultry, game and fish are extremely dangerous, as they splinter, and have been known to pierce the intestines.

BREEDING

Large dogs, like Danes, mastiffs or bloodhounds, don't reach full maturity until they are two years old, and should not be allowed to breed until that age. It is possible to have two litters of puppies a year, but it is not advisable, as it weakens the mother dog's vitality, and the youngsters will be inferior. Young females should be watched for the first signs of maturity from the time that they are six months old, and kept under strict supervision for eighteen



RUSSIAN WOLFHOUND

THE EARTH'S BOUNTY.

or twenty days. The best plan is to confine her in a loft, or some upstairs place, away from any possibility of visitors, but she must be taken out for exercise twice a day to keep her in health. After the twentieth day, it will be safe to let her have entire freedom for about five months. After that, it is well to be on the alert, though there may be no cause until the sixth or seventh month. Curtail her liberty for the first eight or ten days, then allow her to visit the selected dog, but on no account allow her to have free range for another ten or twelve days. Sixty-three days can be counted from the day of her visit, but of course there may be a variation of twenty-four or forty-eight hours with different individuals, so prepare a comfortable bed in a sheltered place for about a week before the expiration of her time.

Exercise is beneficial, but over-fatigue or unwonted running and jumping should be avoided, especially as her time draws near. Many of the best authorities advocate admin-

THE EARTH'S BOUNTY

istering a mild dose of medicine a few days before she is due, but we have always found that a little extra fat in the soup answers just as well. We have been very fortunate, never having any serious trouble with any of our mother dogs, and I think perhaps it is due to the fact that they have a varied diet and free range, so that they can take what exercise they like. What is more, we make companions of them, and they are contented and happy.

The ordinary method of keeping breeding dogs in kennels, confined in small enclosures, seems to me most reprehensible, for there is nothing to interest them or keep them occupied, except, of course, in the case of terriers, who can find or make excitement about anything or nothing more important than the falling of a leaf.

We did have one collie, whose appetite always failed during the last few days, and whose puppies came at long intervals. The only trouble was to keep up her strength, and that we did by beating up the yolk of

THE EARTH'S BOUNTY

an egg and adding half a teaspoonful of brandy to it. The dose was repeated at intervals for two or three hours as it seemed advisable. Strange to say, her puppies were born with a want of proper instinct about food, for they would never attempt to nurse till they were forced by hunger, and even then had to be held to her breast and almost taught how to help themselves. But Jinny Dean and her babies are the only family which needed such pernickety nursing.

About four weeks before the babies are expected, a dose of worm medicine is administered, and another one a few days later. We prefer, and always use, Dr. Wurms powders, both for mother and babies. Give babies of any of the large breeds a three-grain dose when three weeks old, and from then on every six weeks until past puppyhood, increasing the dose slowly after the second one.

Use clean, unbroken oat straw for the bed; let it be changed the day after the babies arrive, and every week during the time they occupy the

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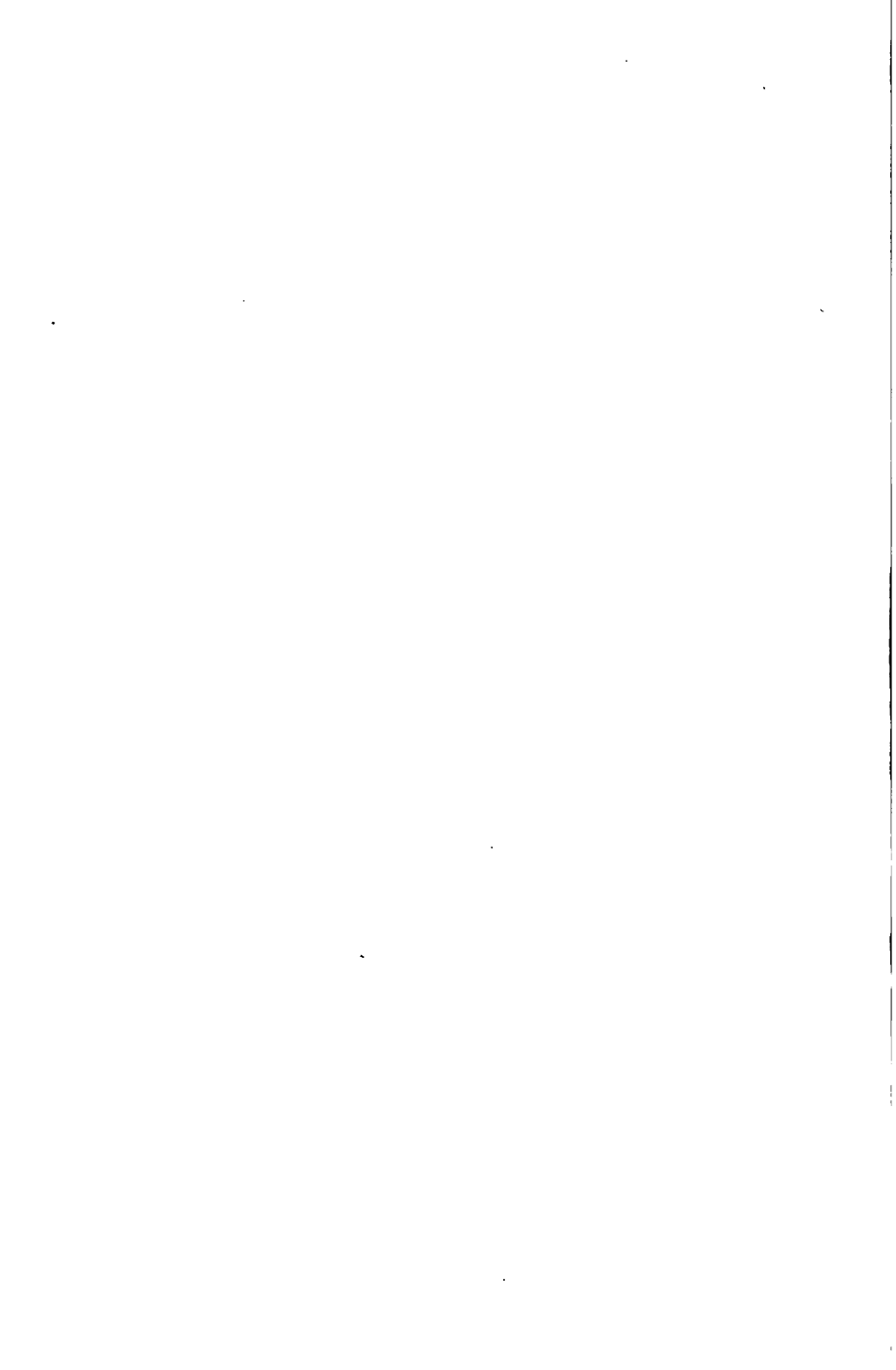
box. In hot weather, keep mother and babies as cool as possible. We have an old smoke-house shaded by a large tree, with a big, open chimney at one end, and a door at the other, so there is always plenty of ventilation. On very sultry days a burlap curtain is thoroughly soaked in water and hung over the screen door to lower the temperature. And in the winter the maternity ward is a little room partitioned off from the brooder-house, which is always comfortably warm, as the steam-pipes pass through it.

Puppies should be taught to drink as soon as possible after they are six weeks old. We use goats' milk, but when there are no goats to furnish it, condensed milk is really the safest. If cows' milk has to be used, it must be scalded and allowed to cool as for a human baby; and let me assure you that as much care should be exercised in feeding young animals as young children, for, like children, the least neglect is likely to cause bowel trouble and indigestion.

Lessons in eating will be much easier if the



A TOY POMERANIAN



THE EARTH'S BOUNTY.

mother is taken away for an hour or so before the milk is offered. Gradually lengthen her absence from day to day until she only spends the night with her children, and the weaning will be accomplished without pain to any one. After the first week we add a little lime-water to the milk, and then gradually introduce oatmeal which has been thoroughly boiled; then a little cornmeal, also well boiled. Large bones, with hardly a suspicion of meat on them, keep the babies amused, and help them to cut their teeth. Chicken-broth, with a little of the meat chopped, and some whole wheat bread crumbled or mixed with it, is a good dinner when they have learned to eat.

Accomplish house-breaking as early in life as possible. A good rule with small dogs, who live in the house, is never to leave a puppy alone in a room, because one mistake encourages repetition. Exert a diligent watchfulness at first. When a puppy commences to fidget and sniff about, pick it up and put it outside, or in a box containing sawdust. Pa-

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tience and perseverance will be tested pretty severely for two or three weeks, but after that time nothing but neglect to keep the box clean will cause trouble.

Perhaps it is as well to warn city housekeepers, who may have to depend entirely on a box of sawdust or ashes for their pet's convenience, that neither cats nor dogs will use it more than two or three times. This is frequently the cause of pet animals becoming careless in their manners.

Large dogs can be taught tidy ways by being fed at six o'clock in the evening, taken for a walk at night, then chained in a shed or outer kitchen, their range never being more than three feet from their bed. Release early in the morning, and take out of doors immediately. They will soon understand the discipline of enforced hours. The close proximity to their bed causes natural instinct to govern their behavior, and the habit, once formed, will prevail through life.

THE EARTH'S BOUNTY,

TOY DOGS

The toy varieties, such as Japanese, Blenheim and King Charles spaniels, Pomeranians, Maltese and Yorkshire terriers, can't really be treated like ordinary dogs, they are such ethereal, sensitive mites. A cross or unkind word grieves them to the verge of illness. I think the Pomeranians and Yorkshires are the most engaging, because they have withstood the years of inbreeding and hot-house existence which were necessary to reduce them to their present pigmyism and beauty, and still retain a goodly supply of vim and gumption.

Four years ago I became the possessor of a six-weeks-old Yorkshire of high degree. Not caring very much for the ordinary toy animal, I resolved to try to waken the dormant terrier in him, even if it meant sacrificing his angelic refinement and silky raiment.

Well, it is a case of canine Jekyll and Hyde now. Newly bathed, brushed and beribboned for a visit to the city, he is a perfect little aristo-

THE EARTH'S BOUNTY

crat, but at home he romps wildly about the place, "bossing" everything from the horse to a tame lovebird who flies about my workroom. Time and again he has rushed after a rabbit up hill and down dale with as much reckless gusto as if he were an untrained Irish terrier, and, of course, briars and burs have played havoc with his coat; but he is a splendid watchdog, can track me as perfectly as any bird-dog, and tramp for miles in any weather without showing fatigue. He only measures 13 inches from head to tail, stands $5\frac{1}{2}$ inches high, and weighs $3\frac{1}{8}$ pounds.

Great care must be exercised in selecting the fundamental breeding-stock, as health and strength are much more difficult to find than beauty, and though such drawing-room habitants must be kept small and dainty, every precaution should be taken to insure their being healthy creatures, with sweet, wholesome breaths which will not offend.

Once having procured such a specimen, it only requires the exercise of common sense in

THE EARTH'S BOUNTY

their management, and time and patience to cultivate their coats, to insure their having good, salable youngsters. Bathing and grooming the long-haired varieties is quite a work of art, and must not be undertaken in a careless, higgledy-piggledy manner.

Bathing I don't believe in very much, for it robs the skin of the natural oil which is needed to feed the hair and keep it glossy. Twice a week a mixture of cocoanut and sweet almond oil is brushed into the hair, and then thoroughly removed with clean brushes; each stroke being taken from the parting down the back to avoid tangling.

When a bath is absolutely necessary, stand the dog in a small tub half-filled with warm water, rub white Castile soap on to a flesh-brush, and use as you would dry. The under part of the body should be brushed from the neck to the hind legs. Take the front paws in your left hand whilst the dog stands on his hind legs in the water, and you will find it quite easy to do. Leave the head until the

THE EARTH'S BOUNTY

last, hold the ears backwards and wash, then gather the hair to the back of the head, and hold the little victim's nose up in the air whilst you brush the hair toward the back.

Two fresh waters should be used and the sponge instead of a brush, for the rinsing process. When every particle of soap has been removed, lift the little chap out on to a warm towel, and lay another one over him, gently—squeezing the water out of the hair, but don't rub or ruffle it. Remove to a dry towel, and brush until dry. When the hair seems quite dry, just a suspicion of oil should be rubbed on to the brush to prevent the hair from being fluffy for in such condition it mats easily.

Yorkshire terriers are usually a great disappointment to amateurs, because they are black and short-haired, and don't look in the least like their parents. But the hair soon commences to grow, and should be trained to part down the centre of the back from the time they are two months old, at which time the color will gradually commence to change at the roots

THE EARTH'S BOUNTY

as it grows out, and should be like polished steel—a bright metallic blue-gray, except on the legs and head and mustache, which should be a bright tan.

There has been so much fuss lately about hydrophobia, that if a poor half-grown dog cutting a nasty double tooth, and like any human baby, gets cross and slobbery, it is apt to get shot, or at least held under suspicion. My grandfather, father, and husband, all having been dog-lovers, I have been brought in contact with people owning and breeding dogs of one sort or another all my life, yet I never heard of any one who makes a business of keeping dogs having any personal experience with hydrophobia, and I firmly believe that most of the cases cited are due either to excessive nervous imagination or a bad condition of the person's blood when bitten.

A young brindle collie once came to us, who was foaming at the mouth, wild-eyed, and snapped at every one who came near him, and would do nothing but hide in a dark corner. I put on

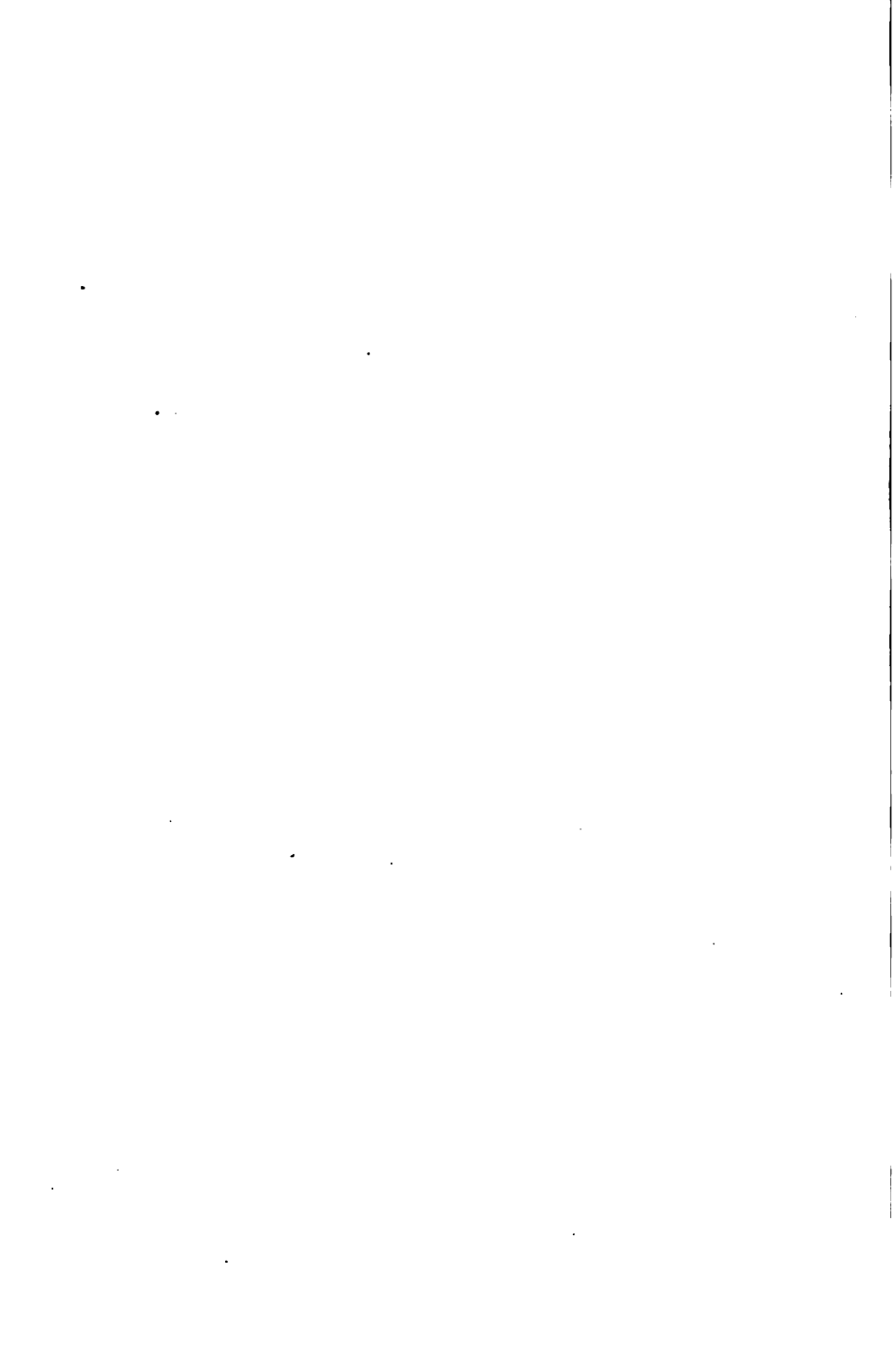
THE EARTH'S BOUNTY.

strong gloves, put a rope round his neck, and after a struggle succeeded in pouring a goodly dose of salt and water down his throat, and a few hours later a dose of castor oil. He had been simply worried into a state of nervous illness and bad temper by worms, and had he gone to nervous people, would in all probability have been shot for a mad dog. Another easily mistaken case was a lovely old mother dog. A man came up to the house on a hot June day and asked if we would lend him a gun or a revolver to shoot a mad dog with.

He was carting a load of furniture to a gentlemen's country home a few miles beyond us, and had tied the dog under the wagon to make the journey on foot, whilst her puppies were carried in a basket. Our Mr. Fred got a gun, and volunteered to do the shooting if he found it necessary after looking at the animal. He found her lying on the ground, still tied to the cart, the saliva running out of her mouth, and generally displaying the signs which are supposed to indicate madness.



THE MOST BEAUTIFUL YORKSHIRE IN AMERICA



THE EARTH'S BOUNTY

She was on the verge of a fit caused by the weight of milk which had accumulated during the hours of separation from her puppies and the unaccustomed exercise in the heat.

Mr. Fred cut her loose, sent up to the barn for the stoneboat and horse, and brought her up to the root-cellar, which of course was empty at that time of year. Two hours of the cool darkness reduced her condition to so near normal that her puppies were given to her, and the next day, when the owner drove over for her, she was apparently as well as ever. I have cited these cases to show how easily ordinary suffering of various kinds may be mistaken for madness.

ITINERARY OF THE YEAR'S WORK

JANUARY

NEW YEAR is a splendid time to make good resolutions, and none will be more advantageous to the farmer than the determination to start records. It takes very little time to keep detailed account of each animal's achievement after the system is once organized; and the long winter evening is just the time to do the clerical part of the work. Give each animal a number, if you are too practical to name it. Have a book for each variety of stock kept: cows, sheep, pigs, horses, poultry, etc., etc., and another one for crops. Number or name each field. Our system is simple in the extreme: a page is devoted to each animal; the date of birth or purchase heads it. For a cow, the opposite page is devoted to milk and butter records, as

THE EARTH'S BOUNTY

explained in Chapter VII. Under the name and birth or purchase, comes when bred and to whom; date when due; to be followed by the actual event, sex of offspring and name or number bestowed upon it. Crops are kept much in the same way: name or number of the field heads the page; then date of plowing and harvesting. In pencil on the opposite page, suggestions for catch-crops, and rotation of main planting. Small note-pads, which cost three cents apiece, are nailed up in the different barns, chicken-houses, feed-house, etc., and notes of all happenings are made immediately. Then the sheets are torn off from each every Saturday and brought to the house, for the items to be transferred to the different books. It does not occupy half an hour weekly, saves innumerable accidents and mistakes, and furnishes an accurately clear knowledge of each animal's value.

The Wood-lot.—This is the very best month of the whole year practically to test a knowledge of forestry. Select trees and have a sup-

THE EARTH'S BOUNTY

ply of firewood and fence-posts cut now, whilst there is no other heavy outdoor work demanding attention. The crisp January air lends vim to the axe, and turns hard work into play. Besides, it is much easier for horses to draw home heavy logs on a low sleigh over snow, than on a wagon over rough roads. Splitting the wood into stove and half-lengths fills stormy days profitably.

Thresh out all remaining grain and store away in the feed-house bins.

Barn and Stock.—Give the lambs plenty of food, and market whilst prices are at their zenith.

Use plenty of bedding in the horse and cow stalls. A comfortable bed saves food, and is a valuable factor in keeping stock in good condition.

It is at this season, when cows are deprived of all active exercise, that grooming is of paramount importance in keeping the skin healthy. Use burlap blankets, and have them scoured several times during the winter. A

THE EARTH'S BOUNTY

clean cow gives more and better milk and butter. Be careful about the water supply; let it be bountiful and pure. One pail of boiling water will take the iciness from several pails, and prevent the consumer being chilled. When horses come in hot, see that they are taken into a sheltered place for their rub-down, and are blanketed at once. If very wet, change the blankets after a reasonable time. Pigs like warm, dry beds as well as other cattle, and will thrive better if their food is cooked.

Poultry.—Make up breeding pens; feed warm corn at night. If the season is very severe, remove perches and substitute big piles of common hay. The birds will creep up on to them at night, and keep much warmer than if roosting. A bag of dry leaves and hay-mow sweepings, emptied on the poultry-house floor, will induce the hens to scratch, and provide exercise which they can't get when the ground is covered with snow. A green bone and vegetable cutter will earn twice its price if used every day, for green bones and vegetables mean

THE EARTH'S BOUNTY

lots of eggs now, and strong chicks in the future.

Garden.—If the lawn has not already been covered with dressing, let it be done at once. Make another sowing of lettuce, radishes, mustard and cress in the hotbed, for use in March. If the weather is favorable, try and finish up the pruning necessary in orchard and fruit-garden; for detail refer to Chapter VI.

FEBRUARY

Farm machinery should be overhauled; replace injured parts, and sharpen knives, renew washers, etc., etc., to prevent loss of time later in the season when minutes are worth dollars. Learning to take time by the forelock makes a successful farmer.

Clear snow from the paths, but don't make short cuts across the lawn, for if you do it will be marked by a streak long after winter has been banished by spring. Pumps should be left with the handles propped up

THE EARTH'S BOUNTY

at night so the water runs back and there is none to freeze. A lighted lantern placed under the kitchen sink next the pipes will save Jack Frost causing trouble there.

Examine the stores of vegetables and fruits. Remove any that are commencing to decay. A little lime sprinkled on the potatoes will assist their keeping quality, and check sprouting.

The weather has been so uncertain during recent winters that it is safer to cut ice as soon as it is eight inches thick, instead of waiting for it to become thicker.

Barn and Stock.—If straw and cornstalks to be used for bedding are chopped, they will absorb moisture better, and the manure will be more wieldy to distribute.

Cornstalks and hay, chopped, steamed, and mixed with middlings and bran, make good milk rations if you are short of ensilage and roots.

Be careful not to overfeed horses which are doing little work. Try to keep all exercised in turn, and at least turn out into the crew-yard

THE EARTH'S BOUNTY

every fine day. Be generous with fodder for young stock. So much of their feed is consumed to keep up bodily heat.

Poultry.—If you are going to start new flocks of turkeys, geese, guineas, or pigeons, don't delay getting the birds, or they won't have time to be settled in their new quarters before laying time.

Incubators should be started now. Remember, the machine must stand perfectly level, and in a cellar or room where there is the least possible fluctuation of temperature. Set up and regulate the machine according to the maker's instructions and run it for forty-eight hours to be quite sure that the regulator is properly adjusted, before putting in the eggs. Gather eggs intended for hatching several times a day, to prevent their being chilled. Keep in an even temperature, small end downwards, in a shallow box of bran. Use before they are a week old.

If the eggs are sent for from a long distance, let them stand twenty-four hours before

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setting. Watch the air-space in the large ends of eggs which are being incubated.

It is the best guide to follow in adjusting the ventilators in the incubator. If a broody hen can be found, set her at the same time that you start the incubator, then compare the eggs under her from time to time, with those in the machine. Never neglect to air and turn the eggs in the incubator night and morning.

Don't open the machine after the morning of the twentieth day until the morning of the twenty-second, when the chicks should all be out of the shell. It won't hurt those that hatch first to stay in the incubator, but opening a door to take them out would allow moisture to escape, and retard the remaining eggs from hatching.

Garden.—The sap will soon be rising in the maples. Bore, and hang cans to catch the sirup. Time will be saved if a diagram of the garden is made on a large sheet of paper. Decide how much space is to be given to each variety, and

THE EARTH'S BOUNTY

what second crops can be grown. For instance, early peas will have been used by the end of June, and their place can be taken by a second sowing of cucumbers and lettuce-plants. The first sowing of beans can be followed in July by turnips, Brussels sprouts, or celery.

Make out lists of vegetable- and flower-seeds. It is better to order now, when you are sure of getting the variety you want, which is not always so later in the season.

Cabbage, cauliflower, onions, lettuce, egg-plant, and several other vegetables can be started now, either in a hotbed, or, failing that, in boxes in a sunny window of a warm room. Some flower-seeds should be started in the same way, to insure early blooming in the garden if annuals are depended upon. Seed-boxes need not be more than two inches deep. Bore holes in the bottom; cover over with a layer of dry moss or coarse ashes, and fill up with potted mould.

A general rule is to cover seeds not more than their own depth. Press the earth down

THE EARTH'S BOUNTY

with a strip of wood or ordinary desk blotter, and keep the surface moderately moist.

Make cuttings from house-plants, and start in shallow dishes or boxes, for potting-plants later in the season.

MARCH

Gutters and all waterways about the house and buildings should be cleared to insure a clear passage for the thawing ice.

Inside work of all kinds should be finished off, for there will be no time later.

Barn and Stock.—The barn, stables and poultry-houses should be opened a few minutes earlier each day during the month, but don't be in too great a hurry to throw off winter care of stock. March is such an uncertain month, it is best not to be beguiled by its sunshine.

Examine ensilage. Warm days may cause it to turn sour.

Fork over manure and make ready to cart. Clear up barns, hay-mows, and root-cellar.

THE EARTH'S BOUNTY

Poultry.—Old hens will be getting broody. Set all you can, even if you are going to use an incubator, for they are the best foster-mothers for turkeys, geese and ducks, and the eight or nine weeks which are occupied by hatching and brooding give the hens a thorough rest, which renews their vigor for egg production. Of late years eggs have been worth nearly as much in June and July as in November and December.

Have the brooders for motherless babies cleaned and whitewashed for each new lot of chicks that are to be put into them. The temperature should be 95 degrees for the first week; 98 to 100 won't hurt on cold nights, but let in plenty of fresh air during the sunny hours of the day. Encourage the little ones to scratch by putting fresh sweepings from the hay-mow into the playroom every day.

Don't risk open drinking dishes. They nearly always cause trouble. If the chicks don't actually get drowned, they are sure to get wet and chilled, and a chilled chick is a sick chick.

THE EARTH'S BOUNTY

If you mean to increase your flock of pigeons, keep the squabs hatched this month, for they will be the best breeders next winter.

Farm Crops.—Sow clover seed at the rate of ten pounds to an acre, on the land sown with grass-seed last fall. The alternating thaw and freeze will carry it into the ground just deep enough to insure quick germination. Start plowing all ground to be cultivated, just as soon as the weather will permit.

Garden.—If the ground for the vegetable garden was not plowed last fall, it must be done now. Don't be in too great a hurry—wait until the soil is in condition, or you will regret it all the season. It should be just moist enough to gradually fall apart after being squeezed in your hand. If it holds in a solid ball, it is too wet; if it crumbles to dust, too dry. After plowing, harrow and harrow, then roll until finely pulverized. There is no economy in shirking preparation of garden soil, for it is more than half the season's work.

Save poultry droppings to be used to fertilize

THE EARTH'S BOUNTY,

the ground intended for onions or other bulb crops.

Towards the middle of the month remove mulch from asparagus and rhubarb. An extra-early supply of both can be obtained by covering a few roots with barrels which have had the ends knocked out, and piling up fresh manure around the sides. If new asparagus is to be used, select well-drained land, plow deeply, and then make trenches every three feet, thoroughly pulverizing the soil to a depth of $2\frac{1}{2}$ or 3 feet, by removing part of it, mixing it with manure, and replacing. If seed is used (and I think it is much the best), sow one inch apart, two inches deep, and thin the plants later in the season to six inches apart. If the ground has been well enriched, and the plants have been diligently cultivated throughout the season, a light crop of small stalks can be cut the following year, but an entire crop will not be obtained until the third season. If two-year-old plants are used, set six inches apart in rows, and cover three inches deep. A fair crop

THE EARTH'S BOUNTY

can be cut the following spring. But I don't think the subsequent season's crop as good as when seed is used.

If the weather is favorable, peas, carrots, beets, turnips and onions can be sown.

Sow tomatoes or peppers in hotbed or boxes in the house, and a few cucumber and melon seeds on sods to be kept either in the hotbed or in the house. Ventilate hotbeds, and shade from the sun.

Dormant trees and shrubs should be in the ground by the 15th. Fertilize and dig around rose-trees, shrubs, and all plants that remain in the ground during winter.

Currants, gooseberries and raspberries should be sprayed or powdered during the last week of the month. I prefer using the copper-sulphur solution.

APRIL

April is such a busy month that it really seems as if it should have ninety instead of its ordained thirty days. The only way to come out

THE EARTH'S BOUNTY

at all even is to rise a little ahead of the sun, and forget to notice when it disappears. There are such multitudes of things, all of which seem as if they should be done first. This is especially so when the weather has been bad in March.

Bees will be getting busy in the hives, and things must be generally cleared up. Remove any dead from the hive and entrance, and supply sirup made from sugar and water or melted honey, if it seems necessary.

Finish up the general cleaning around lawn and garden; sweep the lawn, trim edges of walks, mend trellises and tack up creepers. Dig flower beds, and get in order for planting.

Hurry through the carpentering or painting that must be done.

Clear any remaining vegetables out of the house-cellar, and let in fresh air to dry out any vapors left from winter storage.

Barn and Stock.—There are sure to be lots of baby creatures to claim attention just now. Take calves away from the mothers at once, and there will be little difficulty in teaching them to

THE EARTH'S BOUNTY

drink out of a pail. Cows and stock generally can be turned into the pasture during the day. Gradually decrease the quantity of mash feed to cows, so that stall-feeding can be entirely eliminated by May.

Shear sheep and goats.

Dig out springs and other drinking-places in the pasture, and destroy as many wild-onion roots as time will permit. It is so annoying to have milk and butter tainted with their objectionable odor. Increase the ewes' feed.

Poultry.—Drop corn from the hens' rations; either wheat, barley or oats can take its place. If the hens are on free range, meat scraps and green bone will not be necessary, as they can now find an abundance of insects.

Mow the grass very short where brood coops are to stand, or place them on sandy soil where the drainage is good. Close the coops at night, and don't open in the morning until the dew is off the grass. It is as important to keep young ducks and geese from getting wet as it is chickens. The ready-mixed chick food (of

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which there are several brands) is the most suitable food, and much safer than the old-fashioned soft food, which readily sours in warm weather.

Farm Crops.—Prepare ground for field crops by plowing, then harrowing three times, with nine days between each. It is the only sure way to free the ground from weeds. If the first sowing of Essex rape is made before the end of the month, it will be ready to use when the pasture commences to get short towards the end of June. Hurry in oats and potatoes; give grass-land and rye-fields a dressing of nitrate of soda.

Garden.—Uncover strawberry beds and cultivate between rows.

Flowers or vegetables in glass houses will need plenty of ventilation, and the glass thickly sprinkled with whitewash to modulate the glare of the sun.

Get sods to pack for future use in violet house, and take out old violet roots.

Start a few more seed-boxes, for unless the

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weather is unusually favorable, it is not safe to sow in the open ground as yet. In fact, most of the small seeds are better raised in the house and transplanted to the open ground after they have got their second or third leaves.

Flowers or vegetables sown in hotbeds or boxes in February or March will require pricking out into fresh boxes, which must be a little deeper than the seed-trays. An inch each way is sufficient space for average seedlings.

All the hardier seeds, such as peas, onions, beets, carrots, turnips, spinach and lettuce, can be sown early in the month.

Plants which have been wintered in cold frames should be got about the 15th, and a little later lettuce, cabbage, cauliflower and sprouts from hotbed.

MAY

Place a pan of water near the beehives. The workers are thirsty little people, and will appreciate the attention. Swarming will be

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checked considerably if the body of an empty hive is placed under the occupied one, after the flow of honey has started.

Regular cutting and rolling of the lawn now, when the grass is making quick growth, will increase its density.

Barn and Stock.—Staved silos which are empty should have the nuts tightened, and any necessary repairs made. If many cattle are being kept, it is advisable to fill a small silo with early crops, to tide over the dry season of mid-summer. Clover, rye and rape will answer, though it is better to have a succession of the latter to cut fresh.

Young horses which are to be used for the first time should be treated carefully. They are unaccustomed to exercise, and cannot stand it like old, experienced animals. Give them light work at first, and short hours.

Brood mares with young foals should have strengthening feed for a week or ten days, but not much hay, as it militates against their regaining correct proportions.

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Remove sows near their time to a quiet segregated pen. Keep an abundant supply of rock salt accessible to all cattle; it is especially necessary in the spring. Small May flies are almost more torturous to cattle than any of their larger relatives which arrive later in the season, so in mercy to the poor creatures, protect them as much as possible.

Don't be in too great a hurry to stop feeding young stock; just a little hay or grain at supper time brings them up to the crew-yard, keeps them tame, and insures steady growth. Provide shelters in the pastures, for both young and old cattle love noon siestas when protected from the sun.

Poultry. — Clean and whitewash poultry-houses. Slake the lime with boiling water. Add an ounce of crude carbolic acid to every pailful, and use while hot. If powdering the hens has been neglected during the winter, make up for it now. It is the multiplying season for insects as well as other creatures. If there are any little chicks which look delicate, add a little

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tincture of iron or a few rusty nails to the drinking-water.

Ducklings and goslings should have more oats and green food than corn. Add bone meal to the mash—a tablespoonful to the quart, and add a tablespoonful of lime-water to every quart of drinking-water. Keep coops dry, and provide shelters to protect them from the sun.

Don't neglect the half-grown chickens, for if you do, it will materially affect the egg-basket next fall. It is better to steal the first eggs from the turkeys' and guinea-fowls' nests, and set them under common hens.

Farm Crops.—Sow the ground prepared last month for carrots, in rows eighteen inches apart, and later thin plants to six inches apart.

Mangel-wurtzels are a staple root-crop for cattle, and should not be neglected. Sow in rows twenty-four inches apart, and thin plants to nine inches apart. Corn, both for grain and silo, should be in by the 15th. Cow-peas for

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fodder or silo should be planted in rows from twenty-four to thirty inches apart. Soja beans need rows $2\frac{1}{2}$ feet apart; about eight beans to every foot. Plant the main or winter crop of potatoes.

Garden.—Plant dahlia and gladiola bulbs. Most of the seedlings which can be reared in the house or hotbed can be planted out by the 15th, and large plants which have been wintered in the house can follow suit by the end of the month. It is better to leave the plants in the pots, and submerge to the brim in the soil. The following seeds can be sown in the open ground: Mignonette, phlox, petunias, nasturtiums, balsams, castor beans, wild cucumber, hyacinth beans.

Put a heavy mulch of clean straw or lawn clippings between the plants in the strawberry beds.

Bed out egg-plants, peppers and tomatoes after the 15th. The sods containing cucumber and melon can also go into the open ground. Cucumber, okra, sweet corn, melon and squash

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seeds should all be sowed about the same time, also string and Lima beans.

Thin out the crops started last month, sow more peas, lettuce, spinach, also late cabbage and celery.

Keep a vigilant lookout for insects. It is better to use Paris green and lime or tobacco dust as a preventive, than to wait until there are sure evidences of trouble.

Don't shirk the hoe and rake. Constant cultivation is the keynote of successful gardening.

JUNE

Feminine farmers will have to steal a little time now from the outdoor work, or there will be a dearth of good things in the winter. Strawberries should be gathered when just ripe, but before they commence to soften in the slightest degree. If the beds have been covered early in the season with straw or grass, the fruit will not need washing, which robs it of so much flavor. Spread the fruit on large platters, sprinkle with

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granulated sugar, and stand out of doors on a table placed in the full glare of the sun. To prevent flies or dust settling on the fruit or sugar, we cover the dishes with panes of ordinary window-glass. The dishes must be taken in before the sun goes down, and put out before it is high in the morning, for three days in succession. When the fruit and sirup is ready, pack into jars, of course screwing down tightly as with other preserves.

Poultry.—The hens which you intend to keep for winter layers should be turned out to forage for their own living during the latter half of this month. It is the preparatory step in the treatment necessary to bring about early moulting.

Hens over one year old should be penned, fattened and marketed, to make room for young stock.

Farm Crops.—Canada peas, sown in April, should be ready to cut for green fodder. Make a first sowing of Japanese millet about the 15th. After the 10th hay can usually be cut. Don't

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risk cutting more than your staff of help can handle readily in case of bad weather.

Grass that is allowed to stand until it is turned into hay loses half its food value, so cut early. Late potatoes can still be planted. Rape sown early in the season will be ready to cut or turn cattle into.

Garden.—If an old-fashioned flower-garden is desired next year, now is the time to start it by sowing seeds of perennials, such as columbine, bluebells, candytuft, sweet-william, heliotrope and many others which can be selected from any seedman's catalogue.

Shrubs that have done flowering should be trimmed, as it is of growth made this year that next year's flowers are born.

Hyacinths, tulips, daffodils and other spring bulbs can be taken up, and either stored or divided and replanted.

Strawberries will be making runners. Peg down as many of the small plants as you will be likely to need for new beds, and cut back all others.

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The ends of raspberry and blackberry canes should be pegged to the ground now to make roots.

Poison Bordeaux mixture, applied through a spraying machine, will check tent-caterpillar and such foliage pests.

Dust the potato vines with Paris green and lime, mixed in equal parts. Prune tomato plants to two or three main stalks, and tie to sticks or mulch heavily around each plant.

Plant succession crops—beans, peas, beets, corn, cucumber, lettuce, Brussels sprouts, etc., etc.

Work every unoccupied inch of ground, and keep down weeds. It is much easier to destroy them in their embryo condition than to have them establish roots.

JULY

Rigid supervision of the back premises should be exercised during this month, to prevent flies and mosquitoes finding congenial breeding-

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places. A small hole or an empty can in which rain water has lodged may be the means of infesting the premises with myriads of the torturous pests. The government has been doing heroic work to try and remove the greatest nuisance of our summers, but as the wretched things are faithful to the place of their birth, every individual home should join in the crusade. I once read—or was told—that castor beans, planted near the house, keep away flies and most insects, and as they are gorgeous tropical-looking plants, which grow very rapidly, we have for years planted them in all the available places around the kitchen quarters and outbuildings. Whether it is their presence, or the perpetual war we wage on suspected breeding-places, I don't know, but visitors invariably notice how free from flies and such things our place is.

Barn and Stock.—The barn and cow-stables—in fact, all the outbuildings—are virtually deserted at this season of the year, for it is very much better to let the cows sleep in the open air

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if there are shelter-sheds in the pasture to protect them from thunder showers. Have a paddock adjoining the horse-stables, and let even the horses enjoy the freedom of an evening frolic, and nights *à la Nature*. Everything being out at night, it is obviously the time to make repairs and improvements in the buildings.

Do try and arrange some method by which running water can be had in the barn next winter; it is such a comfort to the men and cattle.

Pastures will be getting light towards the end of the month, and it is well to feed grain fodder, such as rape or Canada peas.

Poultry.—Hens turned out to forage last month should now be given a morning mash and a supper of wheat or barley. The return to heavy food will start them moulting several weeks earlier than would be the case if kept on a uniform diet. An early moulting insures winter eggs.

Sort out the young stock. Keep the bright, active pullets for stock, and any extra good cockerels. Pen and fatten and market the re-

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mainder to prevent crowding. July is a good month to caponize cockerels for winter roasters.

Don't fail to feed young turkeys at night. Young ducks must be sheltered from heavy thunder showers; so must baby guineas and pheasants.

Farm Crops.—Harvest field carrots, and use the ground for rape and Japanese millet. Plant out winter cabbage. Hill up potatoes. Cultivate field corn for the last time. Purple-topped turnips may be sown between the rows.

Garden.—Gladiola and other plants that throw up tall flower-stalks must be tied up to stakes.

Cut out seed-stalks in asparagus bed, and fork in manure.

Strawberry runners rooted last month should now be cut from the parent plant and transplanted to their permanent home.

Powder grapevines with sulphur if there is any sign of mildew, and thin out the bunches. Apples, pears and other fruits will also be improved if the small ones are removed.

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It is best to cut out the old canes in the blackberry and raspberry patch now, whilst they are easily distinguished from the new shoots on which you depend for next year's supply of berries.

AUGUST

Whitewash the cellar, and if the floor is just earthed, spread a thick layer of clean dry sand over it. Make a few racks of 2x2 scantling for barrels and boxes to stand on that are going to hold fruit or vegetables. The racks should be from nine to twelve inches from the ground, to allow free circulation of air. Commence to collect barrels and boxes from the grocerymen; you will not have to a little later. Watering-wells and cisterns will be at their lowest by this month, so it is a good time to have them cleaned out.

Barn and Stock.—Continue such work as was left over from last month. Get the engine and cutting-machine in order for filling the silo.

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Farm Crops.—Sow the lawn with permanent grass mixture at the rate of $2\frac{1}{2}$ bushels per acre. If July was a wet month, most good hay fields will yield a second crop, which should be cut now. A second cutting of rape is due from a field sowed and cut earlier in the season. The Soja bean sown in May and Japanese millet sown in late June or early July should both be cut and mixed for cow fodder. It can be made into hay or straw in the silo. The latter is the best when there is a silo, but when there is not, or when the crop overruns its capacity, hay made from the mixture is superior to all other fodder for all cattle, whether cows, goats or sheep.

Garden.—In the flower-garden there is generally but little tidying or cultivating to be done, but that should be conscientiously attended to, or the season will be cut short very summarily. In the vegetable garden it is much the same. August is a sort of continuation of July work, and a sort of watching for things to reach their zenith.

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SEPTEMBER

Barn and Stock.—It is time to feed a little grain at night. Commence to fatten pigs. Small potatoes and other unmarketable roots, boiled, partly mashed, and mixed with middlings or shorts, is good stable diet. Surplus fallings of apples and other fruits will be relished by the pigs, and are wholesome fatteners. Don't forget that clean cold water to drink, and a big pan of wet ashes once or twice a week, aids digestion and keeps the animals in good condition.

Poultry.—Look over the exteriors of poultry-houses for cracks and holes; small draughts cause cold and croup.

Choose a bright, dry day to gather fallen leaves, and store to use as scratching material on the floor through the winter.

Two tablespoonsful of oil meal to every quart of morning mash will help the moulting hens to grow new feathers. Ten birds well-housed will give better results than twenty in

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cramped quarters. A pen 12x12 is about right for fifteen hens.

Guinea-fowl and turkeys should have an evening meal, and be encouraged to roost in a house or shed.

Farm Crops.—This is the busy harvest month. Buckwheat should be cut when it commences to turn brown. Leave it in sheaves to dry. When ready, spread a sheet over the hayrack. Take up each sheaf carefully, and when the load has been collected, drive at once to the barn and thresh. We have always used the flail in preference to a machine for buckwheat, because the latter crushes the grain. Choose a bright, dry day, for buckwheat is extremely susceptible to moisture, and it is difficult to thresh if the atmosphere is not clear.

Cut silage crops and fill the silo. Mature corn should be cut before frost robs the stalks of food value. But don't shell the ears until the milk is all dried out of the kernels.

Plowing now not only facilitates work in the spring, but materially improves the qual-

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ity and texture of the soil, especially on damp clayey lands. Sowing rye on poor land now, and plowing it under in the spring as green manure, will prevent leaching and enrich the soil.

Garden.—If it has not yet been established, commence a compost heap at once. Dead leaves, seeds, clippings from the vegetable and flower-garden, small seeds and all such addments, piled in alternate layers with cow manure, and kept moist in some out-of-the-way corner, will decay quickly, and furnish just the right fibrous kind of fertilizer to mix with light soil for potting mould, which should be stored under cover for use during the winter. It will be needed for house-plants and seed-boxes.

Don't neglect to hoe because the season is drawing to a close. Cabbage, cauliflower and sprouts need it especially.

Harvest onions without delay. They are ripe when the tops look dry and fall over. After digging, leave in the sun and air several hours to dry. Before storing, cut off tops and roots.

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Earth up celery; sow spinach and winter turnips before the 10th. Thin out turnips sown last month. Sow spinach, Scotch kale and Brussels sprouts for early spring use.

Sow seeds of cauliflower, cabbage and lettuce for plants to be wintered in a cold frame. Set out a bed of multipliers (onions). They will furnish young green onions in April, before it is possible to get them in any other way.

Dig up potatoes on a dry day, and take at once to a dark shed or room; spread out on the floor for several days before storing for winter. Don't make the common mistake of leaving potatoes in the full light to dry. It is very apt to turn the ends green.

Late tomatoes should be gathered and packed between layers of paper and kept in a cold, dry place; they will ripen gradually, often lasting until Christmas. Melons, cucumbers and squash should be gathered, or covered at night.

Strawberry plants set out early this month will bear next season. Keep the runners cut back on old plants in permanent beds; it will

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materially increase the crop next year. Cultivate between the rows and keep down weeds.

Gather peppers, even if they are still green. Tie them on to a long, thick string, and hang up like clothes, on a line across the garret, or some cool, dry place. They will ripen slowly, and even when quite dry will be invaluable for flavoring savory dishes. If there is still a supply of young okra in the garden, gather the small pods and string on a coarse thread until dry; then put in paper bags for use in stews and soups.

September is a very dangerous month for flowering plants. The days are warm, yet a sharp frost may come any night, so discretion suggests the potting of all tender plants, and taking them under cover at night.

Old pots should be thoroughly scrubbed, and new ones soaked in water for twenty-four hours before using, if you would have early flowers next spring.

Plant such bulbs as hyacinths, narcissus, jonquils, crocuses and snowdrops. Seeds of pop-

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pies, mignonette and candytuft should be sown now for next year's flowering. Divide old and plant new roots of peonies.

Make cuttings from geraniums, fuchsias and roses. Large geraniums not wanted for the house can be wintered safely, if hung up by the roots in a frost-proof cellar.

OCTOBER

Barn and Stock.—Tools, machines and implements of all kinds should be cleaned, rubbed over with kerosene oil, and put under shelter. Look each machine over carefully; note any worn or broken parts, so they can be sent for and replaced during the winter, when outside work is impossible. Waiting for a new share of a plow or blade of a mower often throws work back two or three weeks, in the height of the season. In farming and garden work, forethought makes profitable success.

Hot-house lambs should be appearing in September and October. Ground oats and corn,

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and skim-milk to drink, will bring golden prices in December and January. Feed the ewes well, and let there be a good percentage of succulent roots whilst weaning their young. Economy in feeding is poor policy in feeding market animals.

Poultry. — Commence to fatten birds for Thanksgiving and Christmas. Soft mashes made of scalded milk, in which chopped suet has been boiled, and milk instead of water to drink, will produce juicy, well-flavored meat. Corn-meal, small potatoes, boiled and mashed, are good foundations for a mash. If you have plenty of windfalls in the orchard, chop them up for noon feed. They are fattening, and supply the vegetable food which is essential. The secret of successful flesh-building is, not to satiate the victims. Give only what they will eat within fifteen minutes, and provide as much variety as possible. The last nine days, feed four or five times a day, and increase the amount of moisture in the mash. A tablespoonful of charcoal in every two quarts of mash once a day,

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prevents indigestion. Cracked corn, buckwheat or barley, may be fed at supper time for the first two weeks, but no dry corn for the last nine days. Don't depend on corn alone, for that will make a layer of internal suety fat, instead of flesh. A good supper for the laying hens in the fall is equal parts of whole corn and oats.

Garden.—Lettuce, cauliflower and cabbage seedlings started last month can be transplanted into the cold frame about the 20th. Let them stand one inch apart. Continue to earth up celery. By the end of the month the first crop for fall use can be stored.

Cut asparagus tops and burn at once. Cultivate the bed, and during the last week of the month cover with two or three inches of coarse manure.

Watch the strawberry plants set out in August and September, and remove the runners as they form. If the season is cold, commence to dig up root vegetables, and store for winter use—except salsify and parsnips.

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We have three tiers of troughs running the full length of two sides of the cellar. They are a foot deep and wide, made of common boards, and fastened to the walls, with fifteen inches space between the tiers. About an inch of sand is spread at the bottom, and then such roots as carrots and parsnips are packed to stand upright, and sand filled in all round them. This excludes the air, and prevents the shrinkage which usually takes place when they are thrown higgledy-piggledy into a bin.

Should you have a cement cellar which is very dry, one or two bowls kept full of water will supply moisture. If, on the other hand, it is a damp earthen floor, stands pans filled with lime in the corners, renewing it every few weeks during winter.

Gather parsley and sage, and other herbs; dry thoroughly by spreading on papers in a moderately cool oven; when cold, hang up in paper bags in the garret or storeroom.

If there are many peas or string beans still on the vines, pull them up and hang by the roots

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in a dark shed or cellar, safe from frost. They will keep fresh for two or three weeks.

Pumpkins and winter squash will keep better if gathered and placed on a board an inch or so apart, and left in the sun to thoroughly ripen, of course covering with bags or hay at night.

Clumps of rhubarb or asparagus, taken up and placed in boxes or barrels in a warm cellar, will furnish a supply in January, when they are dainties. Dig up endive, keeping plenty of earth around the roots, and set close together on the cellar floor.

Flowers.—Small flowering bulbs must now be carefully dug up. Don't cut or pull off the stalks until they are withered and dead. Then take them off about an inch from the bulb, using a sharp pair of scissors. Tigridias and Ismenes should be lifted before there is any danger of frost touching them. They keep best when planted in boxes or soil which can be kept in a warm place. Ours go into the back of a large cupboard by the kitchen stove. Gladioli would not be hurt by a slight frost, so can

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wait until after the 15th. Spread them out in a sunny place to dry, then put in paper bags and hang up in the garret.

Canna bulbs are the most difficult to keep over safely. Cut down the tops, and cover thickly with leaves or straw, placing a board raised slightly higher at one end, to insure water running off. Don't dig up until late in November or early in December, according to the season. The purpose is to keep them in the ground as long as possible. But of course they must not stay when there is any danger of its freezing below the immediate surface. Plant them in boxes of earth, and occasionally sprinkle over lightly, if the earth shows signs of being dry during the winter.

Narcissus, jonquils and lilies should now be planted in pots, watered copiously, and placed in a dark cupboard to root, if the flowers are wanted at Christmas time—and who doesn't want flowers at that season. Leave them in the dark for four or five weeks, or until they have made a good growth; after which, bring them

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into a subdued light for about a week before moving into the full light of a south window.

NOVEMBER

Poultry.—Winter eggs represent the major profits in poultry farming, so every effort should be made to insure a goodly supply. Supposing that the house is dry and draught-proof, the birds in good healthy condition, nothing remains but care and food. Hens will soon become debilitated and out of condition when shut up in winter quarters, if worried by vermin, and the bright fall days are just the time to wage war on the several species which seem specially created to torture feathered creatures. It is not an interesting subject, and I should like to skip it, but the unwary amateur must be cautioned.

Suffice it to say that there are two distinct classes of these pests: one which lives on the birds themselves, the others habitants of the fixtures and walls. Both must be attacked

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simultaneously to insure the birds' comfort. Dalmatian powder, dusted into the feathers from an ordinary flour dredger whilst the bird is held by the feet, head downwards, is the most effective method of banishing the first class. Powder the flock every night for a week; then twice a week for two weeks. If the work is done thoroughly, and in conjunction with house-cleaning, no further applications should be necessary until next fall.

The lime, carbolic and kerosened whitewash, recommended in September, will have kept the walls free from intruders, if it has been diligently applied; but the roofs, cracks and crevices in the nest-boxes or other fittings should be painted twice a week throughout the year.

Provide dust-baths. A box a foot and a half square and a foot deep, half filled with fine ashes or dry earth, and placed in a sunny place, will be used readily by the birds, and should be replenished once a week.

Exercise is as essential as cleanliness. Have

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plenty of dry leaves or cut straw on the house and scratching-shed floors.

A common lantern with one half of the glass painted black will be found most useful for night work amongst poultry, for by carrying it close to your side, and turning the black side to the fowls, you insure their not being disturbed or frightened.

Egg Rations.—Morning mash: clover hay, cut into half-inch lengths and steamed over night. For every two quarts, add one quart of ground feed (equal parts of corn and oats, ground together), and half a pint of oil meal.

Noon: cabbage or sweet turnips cut in half and nailed up for the birds to peck at. One pint of millet seed, scattered in the scratching material.

Night: all the whole corn the birds will eat in fifteen minutes. The above quantities are for about fifty hens, and constitute our Monday's, Wednesday's and Friday's rations.

Tuesday, Thursday and Saturday the mash

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consists of equal parts of bran and ground feed.

Noon: ground green bone and Kaffir corn.

Night: whole corn.

Sunday morning: cracked corn, oats, Kaffir corn and millet, all mixed, and scattered in the scratching material. No noon feed. Supper: whole corn as usual. On Sunday a large pan of milk is also placed in each compartment. When there are only a few hens, table-scrap make a good noon feed, if there is not too much potato or fat amongst them.

Garden.—Pull up cabbage and pack them heads down on a dry place. Cover with dry earth and increase the quantity as the thermometer falls. Too early or heavy cover at first is a mistake, as it causes cabbage or any other vegetables packed in this way to heat.

Choose a sheltered, well-drained situation, and sow peas two inches deep. Cover before heavy frost with leaves or bedding. It is only a chance, but it has only failed once in six years with us, to produce peas for the table two or

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three weeks earlier than any sown the following spring.

Mulch spinach, sprouts, kale and strawberry beds. When everything has been stored and bedded for winter, manure and plow the vacant soil.

Flowers.—Protect all plants which are to remain in the ground; get ready, by fertilizing, digging and thoroughly pulverizing beds to be used early in spring; make a deep trench by removing about two feet of the earth, and refill with a mixture of manure and the original soil. Then sow sweet peas. You will reap twice the ordinary number of flowers next summer.

If you intend to buy any house-plants, get them now, before they have been accustomed to the artificial heat of the conservatory.

Allow the grass to grow on the lawn. It acts as a mulch, and protects the roots. An old lawn can be greatly improved by giving it a vigorous combing with a steel rake and scattering hay-seed over it; for the constant freezing and thawing of the coming months will carry down the

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seed, and insure early germination. Cover very lightly with a dressing of finely-sifted manure. I don't recommend covering lawns with coarse manure, for it is unsightly, and very difficult to remove in the spring without injuring the sod.

Syringas, snowballs and lilacs may still be planted. Sheathe the tender and half-hardy roses in straw.

DECEMBER

All round the place there are jobs to be done. Remove dead vines, stocks and annuals, and trim all permanent vines, plants and shrubs, for nothing looks so desolate as the lifeless ghosts of summer. Mend drives and fences; prune ornamental trees and fruit-trees. Clear rubbish and brush from the edges of ponds from which ice is to be cut. Get the ice-house in order.

Take advantage of the long evenings to read up on any of the subjects which have bothered you during the past season, and generally gather up all the loose ends in every department. Make

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up the year's accounts, and then take two or three weeks' real rest. A visit to the city or to friends will create a fresh supply of enthusiasm and appreciation for the freedom and comforts of the self-made home.



THE END

By KATE V. SAINT MAUR

A Self-Supporting Home

The book tells, with a common sense practicality, the story of a family who got disgusted with the little they got for their money in a city apartment and determined to try their luck in the country. Rental at \$15 per month instead of \$50, was their first saving, and, judging from the picture of the homelike and attractive house they secured for the former sum, they probably agreed that economy was not the sole advantage secured by the change.

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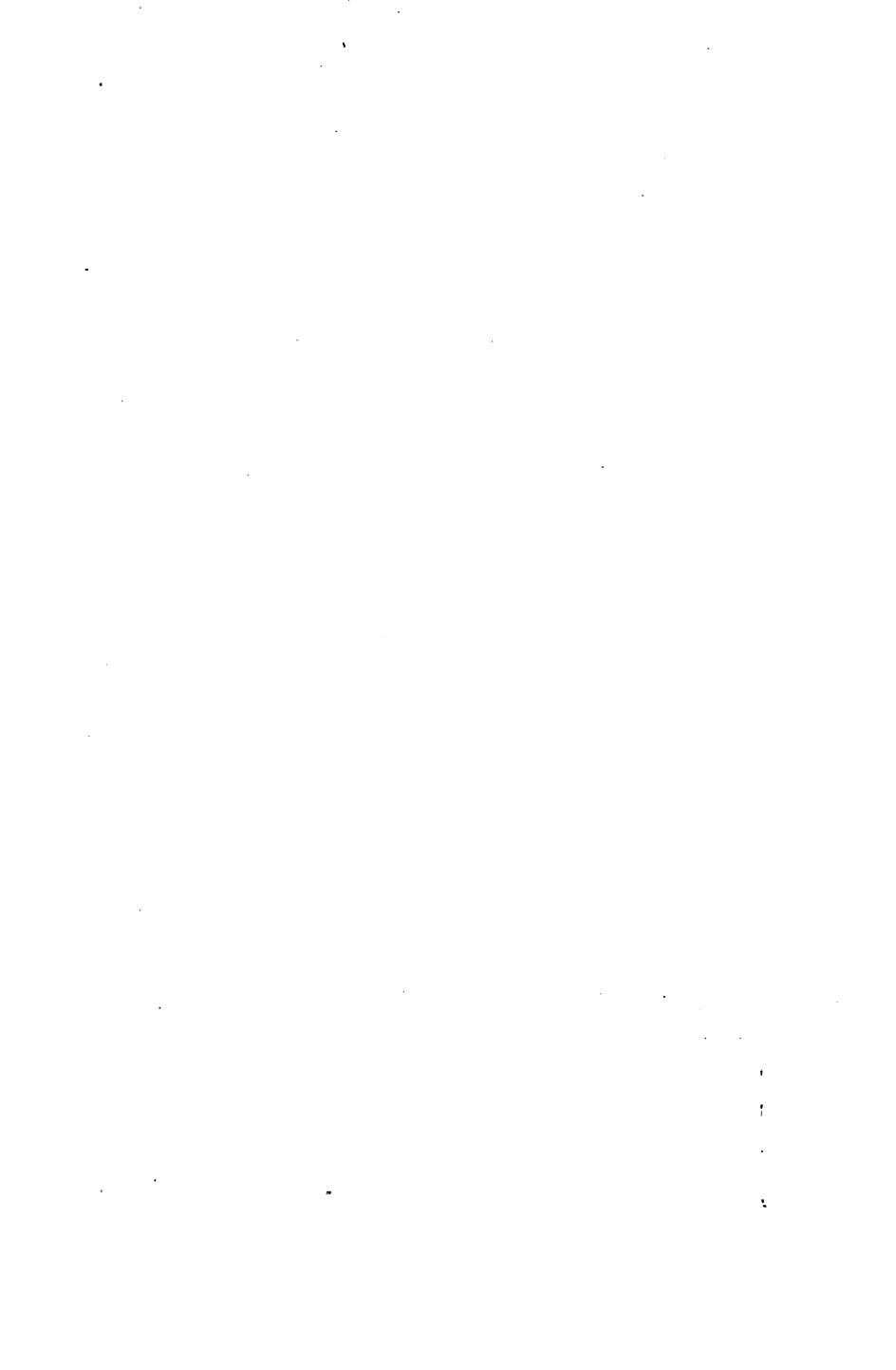
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